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Ecological Research Associates

FINAL REPORT

INVENTORY OF TERRESTRIAL AND AQUATIC
WILDLIFE SPECIES
SOCORRO DISTRICT BLM, NEW MEXICO

TO:
BUREAU OF LAND MANAGEMENT
SOCORRO DISTRICT OFFICE
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INVENTORY OF TERRESTRIAL AND
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SOCORRO DISTRICT, BLM, NEW MEXICO

Final Report

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April 1980

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TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	1
STUDY AREA	2
METHODS	4
Habitat Type Verification	4
Transect Locations	6
Systematic Bird Survey	6
Opportunistic Bird Survey	8
Systematic Mammal Surveys	9
Opportunistic Mammal Survey	10
Reptile and Amphibian Survey	10
Fish Survey	11
Special Habitat Features	11
Special Use Areas	11
RESULTS	12
Habitat Type Verification	12
Transect Location	14
Special Habitat Features	14
Special Use Areas	15
Fish	16
Species Accounts	16
Amphibians	24
Species Accounts	24
Reptiles	33
Species Accounts	35
Abundance and Distribution of Reptiles and Amphibians	53
Mammals	54
Species Accounts	57
Abundance and Distribution of Mammals	87
Birds	95
Bird Densities by Transect and Habitat Type	96
Bird Species Diversity by Habitat Type	143
Bird Diversity Values	143

TABLE OF CONTENTS
(cont'd)

	<u>Page</u>
RESULTS (cont'd)	
Nocturnal Bird Survey	148
Threatened and Endangered Species	148
DISCUSSION	153
Malpais Habitats	153
Pinyon-Juniper Habitats	154
Habitats Incorrectly Typed	154
Importance of Habitat Types to Wildlife	154
LITERATURE CITED	159
APPENDIX 1	164
APPENDIX 2	211
APPENDIX 3	278

LIST OF TABLES

Table	Page
1. Standard habitat types occurring in the Malpais, Driveway, and Quemado Planning Units, Socorro District, BLM	5
2. Location, description, and site number for all sites sampled in the Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979	13
3. Fish that are documented or suspected to occur in the BLM Socorro District or that are located near to and downstream from BLM lands in the Socorro District	17
4. Amphibians that were documented as occurring on or immediately adjacent to the Quemado, Malpais, and Driveway Planning Units of the Socorro District, BLM	25
5. Reptiles that were documented as occurring on or immediately adjacent to the Quemado, Malpais, and Driveway Planning Units of the Socorro District, BLM	34
6. Mammals documented or expected to occur on or immediately adjacent to the Quemado, Malpais, and Driveway Planning Units of the Socorro District, BLM	55
7. Number of small mammals captured in snap traps during summer and winter trapping in Quemado, Driveway, and Malpais Planning Units of the Socorro District, BLM, New Mexico	88
8. Trap data for summer and winter efforts, Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979	90
9. Small mammals trapped in the Quemado, Driveway, and Malpais Planning Units during summer and winter (1979) trapping efforts in 17 habitat types	93
10. Index of relative abundance by habitat type for mammals observed opportunistically in the Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979	94
11. Birds that were documented as occurring in the Quemado, Malpais, and the Driveway Planning Units of the Socorro District, BLM, New Mexico by LGL Biologists	97
12. Species list and estimated density for birds at Site No. 2	102

LIST OF TABLES

(cont'd)

Table	<u>Page</u>
13. Species list and estimated density for birds at Site No. 12	103
14. Species list and estimated densities for birds at Site No. 25	104
15. Species list and estimated mean densities for birds observed in standard habitat type No. 002, based on data from site numbers 2, 12, and 25	105
16. Species list and estimated density for birds at Site No. 13	106
17. Species list and estimated density for birds at Site No. 29	107
18. Species list and estimated mean densities for birds observed in standard habitat type No. 004, based on data from site numbers 13 and 29	108
19. Species list and estimated density for birds at Site No. 4	110
20. Species list and estimated density for birds at Site No. 8	111
21. Species list and estimated density for birds at Site No. 9	112
22. Species list and estimated density for birds at Site No. 10	113
23. Species list and estimated density for birds at Site No. 11	114
24. Species list and estimated densities for birds at Site No. 15	115
25. Species list and estimated densities for birds at Site No. 16	116
26. Species list and estimated densities for birds at Site No. 18	117
27. Species list and estimated densities for birds at Site No. 20	118

LIST OF TABLES

(cont'd)

Table	Page
28. Species list and estimated densities for birds at Site No. 26	120
29. Species list and estimated mean densities for birds observed in standard habitat type No. 005/007, based on data from site numbers 4, 8, 9, 10, 11, 15, 16, 18, 20, and 26	121
30. Species list and estimated densities for birds at Site No. 17	124
31. Species list and estimated densities for birds at Site No. 23	125
32. Species list and estimated density for birds at Site No. 5	126
33. Species list and estimated densities for birds in Site No. 14	128
34. Species list and estimated densities for birds at Site No. 1	129
35. Species list and estimated densities for birds at Site No. 24	130
36. Species list and estimated densities for birds at Site No. 28	131
37. Species list and estimated densities for birds at Site No. 27	132
38. Species list and estimated densities for birds at Site No. 19	134
39. Species list and estimated density for birds at Site No. 3	135
40. Species list and estimated densities for birds at Site No. 22	137
41. Species list and estimated densities for birds at Site No. 21	138
42. Species list and estimated density for birds at Site No. 6	140

LIST OF TABLES
(cont'd)

Table	Page
43. Species list and estimated density for birds at Site No. 7	142
44. Summer bird species diversity, richness, and evenness indices by habitat type and site number, BLM, Socorro District, New Mexico, 1979	144
45. Winter bird species diversity, richness, and evenness indices by habitat type and site number, BLM, Socorro District, New Mexico, 1979	145
46. Owl species identified in the study area	149
47. Numbers of bird and mammal species observed, by habitat type, in the Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979	156

APPENDIX 2 TABLES

48. Bird densities and coefficient of detectability for each species, date, and transect	212
49. Bird densities and coefficient of detectability for each species, date, and transect	213
50. Bird densities and coefficient of detectability for each species, date, and transect	214
51. Bird densities and coefficient of detectability for each species, date, and transect	218
52. Bird densities and coefficient of detectability for each species, date, and transect	220
53. Bird densities and coefficient of detectability for each species, date, and transect	221
54. Bird densities and coefficient of detectability for each species, date, and transect	225
55. Bird densities and coefficient of detectability for each species, date, and transect	227
56. Bird densities and coefficient of detectability for each species, date, and transect	229

LIST OF TABLES

(cont'd)

Table	Page
57. Bird densities and coefficient of detectability for each species, date, and transect	231
58. Bird densities and coefficient of detectability for each species, date, and transect	233
59. Bird densities and coefficient of detectability for each species, date, and transect	235
60. Bird densities and coefficient of detectability for each species, date, and transect	237
61. Bird densities and coefficient of detectability for each species, date, and transect	238
62. Bird densities and coefficient of detectability for each species, date, and transect	239
63. Bird densities and coefficient of detectability for each species, date, and transect	241
64. Bird densities and coefficient of detectability for each species, date, and transect	243
65. Bird densities and coefficient of detectability for each species, date, and transect	245
66. Bird densities and coefficient of detectability for each species, date, and transect	247
67. Bird densities and coefficient of detectability for each species, date, and transect	248
68. Bird densities and coefficient of detectability for each species, date, and transect	251
69. Bird densities and coefficient of detectability for each species, date, and transect	253
70. Bird densities and coefficient of detectability for each species, date, and transect	255
71. Bird densities and coefficient of detectability for each species, date, and transect	258
72. Bird densities and coefficient of detectability for each species, date, and transect	260

LIST OF TABLES
(cont'd)

Table	Page
73. Bird densities and coefficient of detectability for each species, date, and transect	262
74. Bird densities and coefficient of detectability for each species, date, and transect	264
75. Bird densities and coefficient of detectability for each species, date, and transect	266
76. Bird densities and coefficient of detectability for each species, date, and transect	268
77. Bird densities and coefficient of detectability for each species, date, and transect	269
78. Bird densities and coefficient of detectability for each species, date, and transect	271
79. Bird densities and coefficient of detectability for each species, date, and transect	273
80. Bird densities and coefficient of detectability for each species, date, and transect	275
81. Bird densities and coefficient of detectability for each species, date, and transect	276

APPENDIX 3 TABLES

82. Identification of mammals from BLM, Socorro District Project, New Mexico, 1979	279
83. Species Habitat Feature Map Listing	283
84. Verified and hypothetical bird occurrence by habitat type	289

LIST OF FIGURES

Figure	Page
1. Map of the study area	3
2. Transect locations on study area	7
3. Bird diversity indices by season for habitat types in the BLM Socorro District	147
4. Verified occurrences of bald eagles and peregrine falcons on the study area	151
5. Verified occurrence of Bell's vireo on the study area	152

APPENDIX 1 FIGURES

6. Records of occurrence for Arizona tiger salamander and Plains spadefoot	165
7. Records of occurrence for Western spadefoot and Woodhouse's toad	166
8. Records of occurrence for red-spotted toad and canyon treefrog	167
9. Records of occurrence for lesser earless lizard and leopard lizard	168
10. Records of occurrence for desert spiny lizard and crevice spiny lizard	169
11. Records of occurrence for round-tailed horned lizard and Texas horned lizard	170
12. Records of occurrence for Great Plains skink and many-lined skink	171
13. Records of occurrence for plateau whiptail and chihuahua whiptail	172
14. Records of occurrence for coachwhip and black-necked garter snake	173
15. Records of occurrence for western terrestrial garter snake and black-tailed rattlesnake	174
16. Records of occurrence for prairie rattlesnake	175
17. Records of occurrence for dwarf shrew	176

LIST OF FIGURES
(cont'd)

Figure	Page
18. Records of occurrence for yuma myotis and little brown myotis	177
19. Records of occurrence for southwestern myotis and long-eared myotis	178
20. Records of occurrence for fringed myotis and long-legged myotis	179
21. Records of occurrence for California myotis and small-footed myotis	180
22. Records of occurrence for silver-haired bat and western pipistrelle	181
23. Records of occurrence for big brown bat and hoary bat	182
24. Records of occurrence for spotted bat and Allen's big eared bat	183
25. Records of occurrence for Townsend's big-eared bat and pallid bat	184
26. Records of occurrence for Brazilian free-tailed bat and big free-tailed bat	185
27. Records of occurrence for eastern cottontail and desert cottontail	186
28. Records of occurrence for black-tailed jackrabbit and cliff chipmunk	187
29. Records of occurrence for gray-collared chipmunk and white-tailed antelope squirrel	188
30. Records of occurrence for thirteen-lined ground squirrel and spotted ground squirrel	189
31. Records of occurrence for rock squirrel and golden-mantled ground squirrel	190
32. Records of occurrence for Gunnison's prairie dog and Abert's squirrel	191

LIST OF FIGURES
(cont'd)

Figure	Page
33. Records of occurrence for red squirrel and Botta's pocket gopher	192
34. Records of occurrence for silky pocket mouse and plains pocket mouse	193
35. Records of occurrence for Ord's kangaroo rat and banner-tailed kangaroo rat	194
36. Records of occurrence for Merriam's kangaroo rat and western harvest mouse	195
37. Records of occurrence for deer mouse and white-footed mouse	196
38. Records of occurrence for brush mouse and pinyon mouse	197
39. Records of occurrence for rock mouse and northern grasshopper mouse	198
40. Records of occurrence for tawny-bellied cotton rat and southern plains woodrat	199
41. Records of occurrence for white-throated woodrat and Stephen's woodrat	200
42. Records of occurrence for Mexican woodrat and Mexican vole	201
43. Records of occurrence for muskrat and porcupine	202
44. Records of occurrence for coyote and kit fox	203
45. Records of occurrence for gray fox and black bear	204
46. Records of occurrence for ringtail and black-footed ferret	205
47. Records of occurrence for long-tailed weasel and badger	206
48. Records of occurrence for striped skunk and hog-nosed skunk	207
49. Records of occurrence for mountain lion and bobcat	208

LIST OF FIGURES

(cont'd)

Figure	Page
50. Records of occurrence for elk and mule deer	209
51. Records of occurrence for white-tailed deer and pronghorn	210

INVENTORY OF TERRESTRIAL AND AQUATIC WILDLIFE
SPECIES SOCORRO DISTRICT, BLM, NEW MEXICO

INTRODUCTION

The Bureau of Land Management (BLM) of the United States Department of the Interior (USDI) contracted LGL Ecological Research Associates, Inc. (LGL) to perform specified inventories of terrestrial and aquatic wildlife on certain planning units of BLM managed lands in the Socorro District of New Mexico. Specific objectives of the contract were as follows:

1. Determine wildlife species occurrence throughout the designated study area.
2. Identify and prepare for permanent collections, representative small mammal specimens, as well as specimens of herptiles not easily identified by external characteristics.
3. Estimate wildlife species abundance and avian diversity within each Standard Habitat Type.
4. Emphasize surveys of threatened and endangered species as identified by state and federal agencies.
5. Determine and delineate special use areas.
6. Locate all transect sites and survey routes.
7. Map all transect sites and survey routes.
8. Conduct a comprehensive literature review to support and supplement field inventory reports.

An extensive literature review was completed early in the study in order to summarize existing knowledge about the vertebrates of the Socorro District. The results of this literature review were submitted to the Socorro District Office on 1 July 1979, entitled: "Vertebrates of West-Central New Mexico - A Literature Review Concerning Species in the BLM's Socorro District", by Dr. Joe C. Truett. The report included species accounts and distribution maps as determined from existing publications. Data from field surveys conducted during this study will serve to expand and verify the occurrence and distribution of all wildlife species expected and verified within the study area. The wildlife inventories and literature review performed under this contract were designed to provide data necessary to support environmental impact statements and make management decisions with regard to multiple use of public

lands. The inventory data presented in this report were collected and assimilated to satisfy the mandates of: The National Environmental Policy Act (NEPA) of 1969, The Endangered Species Act of 1973, The Federal Land Policy and Management Act of 1976, and the BLM Organic Act of 1976.

STUDY AREA

The study area lies primarily in the Upper Sonoran Life Zone as described by Bailey (1931). The Upper Sonoran Zone comprises two-thirds of New Mexico's surface area and lies generally between 1372 and 2286 m elevation. Plant and animal communities in this zone vary drastically throughout the state. Wildlife inventory data were collected during this study within the boundaries of a specified study area, including three planning units of the Socorro District. These planning units were: the Driveway Planning Unit, the Malpais Planning Unit, and the Quemado Planning Unit (Fig. 1). The planning units occur in Valencia, Catron and Socorro Counties, in the West Central portion of New Mexico, and lie to either side of the continental divide. The Driveway Planning Unit is basically a grassland of rolling hills and valleys. The southernmost portion of the Driveway Planning Unit is higher country, broken by mountains and arroyos.

The Quemado Planning Unit is principally comprised of pinyon-juniper (*Pinus edulis/Juniperus monosperma*) and broken grasslands interspersed throughout low hills and valleys. The pinyon-juniper communities are relatively homogenous, but occasionally blend into a ponderosa pine (*Pinus ponderosa*) community at higher elevations and into mixed shrub communities or grasslands at lower altitudes.

The Malpais Planning Unit is dominated by a lava substrate which supports vegetation communities ranging from grasslands to mixed conifer. On older lava flows, soil formation has progressed sufficiently to support substantial grassland communities. On the more recent flows, the vegetation communities are dominated by woody species rooted in the many cracks and fissures. Pinyon-juniper communities with scattered ponderosa pine and a sparse herbaceous understory dominate the Malpais area.

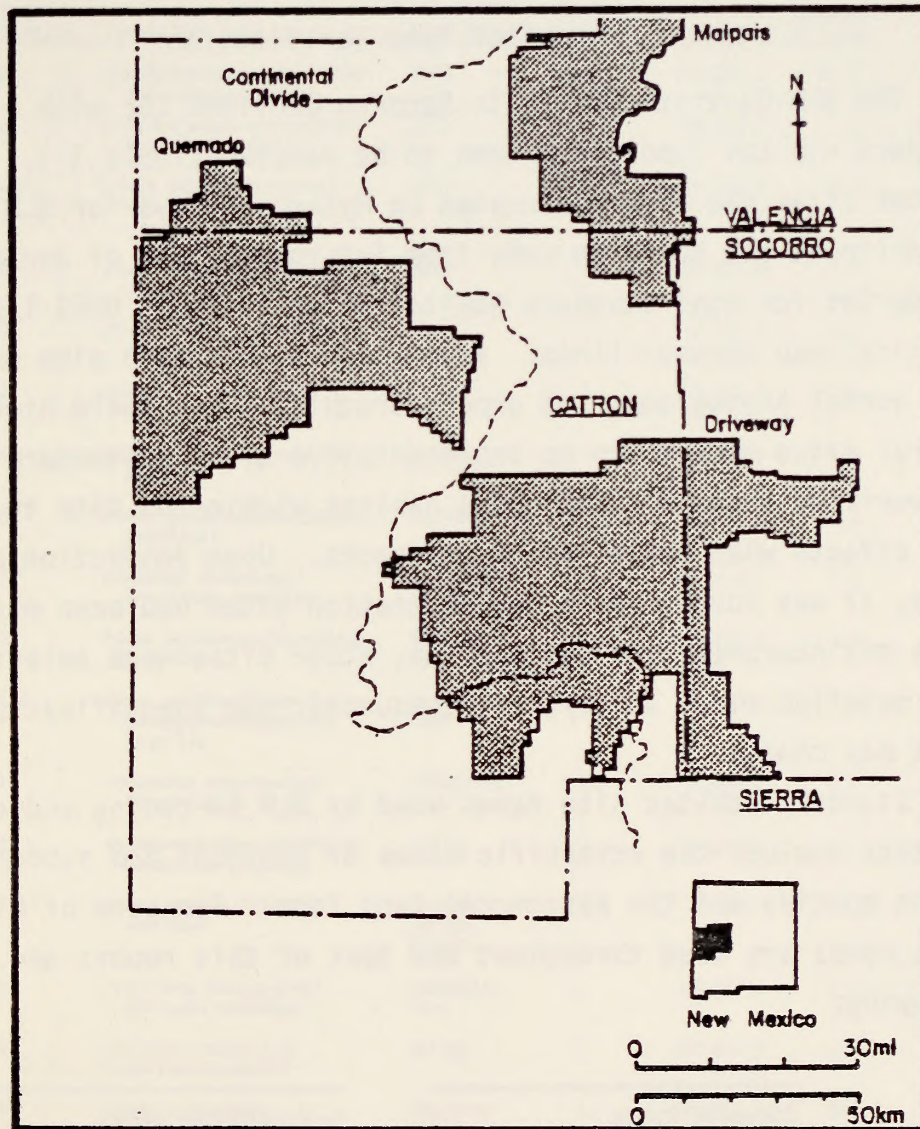


Fig. 1. Map of the study area.

The study area contained approximately 18 habitat types described by BLM.

METHODS

Habitat Type Verification

The BLM District Office in Socorro provided LGL with a list of 18 Standard Habitat Types that were to be sampled (Table 1). All standard habitat sites had been delineated on Mylar overlays for BLM color quads. The delineations had been made from interpretations of aerial photographs. Boundaries for most standard habitat sites followed USGS 1:24,000 topographical map contour lines. Vegetation within each site was determined from aerial photographs and ground truthing. LGL field biologists visited several sites thought to be representative of each standard habitat type and verified areas of contiguous habitat within the site to minimize edge effects when establishing transects. Upon inspection of numerous sites, it was found that a few vegetation sites had been misinterpreted. Where misinterpretation was obvious, other sites were selected for sampling. When detailed range surveys are conducted, the identification of certain sites may change.

Standard habitat site names used by BLM in coding and classifying habitats include the scientific names of dominant and subdominant vegetation species and the associated land form. For ease of discussion, common plant names are used throughout the text of this report and include the following:

Common Name	Scientific Name
Alkali Sacaton	<i>Sporobolus airoides</i>
Apache Plume	<i>Fallugia paradoxa</i>
Broom Snakeweed	<i>Xanthocephalum sarothrae</i>
Blue Grama	<i>Bouteloua gracilis</i>
Juniper	<i>Juniperus monosperma</i>
Pinyon Pine	<i>Pinus edulis</i>
Ponderosa Pine	<i>Pinus ponderosa</i>
Rabbitbrush	<i>Chrysothamnus nauseosus</i>
Russian Thistle	<i>Salsola kali</i>
Four-winged Saltbush	<i>Atriplex canescens</i>
Threeawn	<i>Aristida longiseta</i>

Table 1. Standard habitat types occurring in the Malpais, Driveway, and Quemado Planning Units, Socorro District, BLM.

BLM Code Designation	Vegetation Type	Land Form	No. Sites Sampled	Acreage	Percent of Total
002	<i>Xanthocephalum sarothrae</i> / <i>Bouteloua gracilis</i>	Hill	3	544,271.2	29.5
004	<i>Chrysothamnus nauseosus</i> / <i>Bouteloua gracilis</i>	Hill	2	130,105.2	7.0
005/007	<i>Pinus edulis</i> / <i>Juniperus monosperma</i> / <i>Bouteloua gracilis</i>	Hill	10	604,718.6	32.8
008	<i>Pinus edulis</i> / <i>Bouteloua gracilis</i>	Mesa	1	95,608.0	5.2
009	<i>Pinus edulis</i> / <i>Juniperus monosperma</i>	Mesa	1	10,749.2	0.6
011	<i>Bouteloua gracilis</i> / <i>Aristida longiseta</i>	Hill	1	38,837.5	2.1
014	<i>Salsola kali</i> / <i>Sporobolus airoides</i>	Valley	1	35,704.6	1.9
015	<i>Pinus ponderosa</i> / <i>Bouteloua gracilis</i> *	Mountain	0	20,520.6	1.1
016	<i>Atriplex canescens</i> / <i>Bouteloua gracilis</i>	Lacustrine Plain	1	108,518.1	5.9
018	<i>Pinus ponderosa</i> / <i>Bouteloua gracilis</i>	Endogenic Rock	1	74,233.5	4.0
019/020	<i>Pinus edulis</i> / <i>Juniperus monosperma</i> / <i>Bouteloua gracilis</i>	Endogenic Rock	1	1,440.0	0.08
021	<i>Juniperus monosperma</i> / <i>Pinus edulis</i>	Endogenic Rock	1	2,560.0	0.1
022	<i>Xanthocephalum sarothrae</i> / <i>Bouteloua gracilis</i>	Valley	1	23,680.0	1.3
026	<i>Pinus edulis</i> / <i>Fallugia paradoxa</i>	Intermittent Stream Riparian	1	684.2	0.004
031	<i>Juniperus monosperma</i> / <i>Fallugia paradoxa</i>	Endogenic Rock	1	45,589.5	2.5
032	<i>Atriplex canescens</i> / <i>Bouteloua gracilis</i>	Valley	1	53,097.0	2.8
034	<i>Pinus ponderosa</i> / <i>Pinus edulis</i>	Mountain	1	53,961.9	2.9
036	<i>Chrysothamnus nauseosus</i> / <i>Fallugia paradoxa</i>	Intermittent Stream Riparian	1	1,080.3	0.05

*This vegetation type was misidentified.

Transect Locations

Twenty-nine transects were established in the study area (Fig. 2) representing 18 standard habitat types defined by BLM. USGS 1:24,000 topographical maps were employed in selecting proper terrain for establishment of transects. Starting points on transects were located near accessible roads, or within short walking distances, to facilitate easy access for early morning bird transects. Transect starting and ending points were marked with 1 m x 1 cm concrete reinforcing bars wrapped with colored vinyl engineering flagging. Between end points, transects were marked with flagging attached to wooden lathe strips and to vegetation. Silva Ranger compasses were used to establish bearing determined from the USGS topographical maps (1:24,000). Initially, transect lengths were measured with a 100 m field tape and subsequently by pace, after biologists had established reliable pace distances. All transects were 1600 m and along a single bearing, where habitat and terrain would permit. Otherwise, bearings changed as necessitated (by terrain and habitat). All bearing changes and lengths were noted in the biologist's field notes and recorded on the portable cassette recorders used in the field. All transects were oriented on an east-west configuration when habitat and terrain permitted in order to maximize light conditions when running early morning bird transects.

Systematic Bird Survey

The Emlen Variable Strip transect method (Emlen 1971, 1977) was used to estimate bird densities. All Emlen transects were run between sunrise and about three and one-half hours after sunrise. Transect lengths were 1600 m and strips to 125 m on either side of the transect were included in the census. Biologists traveled the transect length at a speed of approximately one to one and one-half km per hour, depending on habitat conditions. Detection of birds, by sight and sound, were recorded on portable cassette recorders. Visual observations were made using 7 x 35 binoculars and a 9-30X spotting scope. Identification of birds was confirmed through the use of bird field guides (Peterson 1947, 1961;

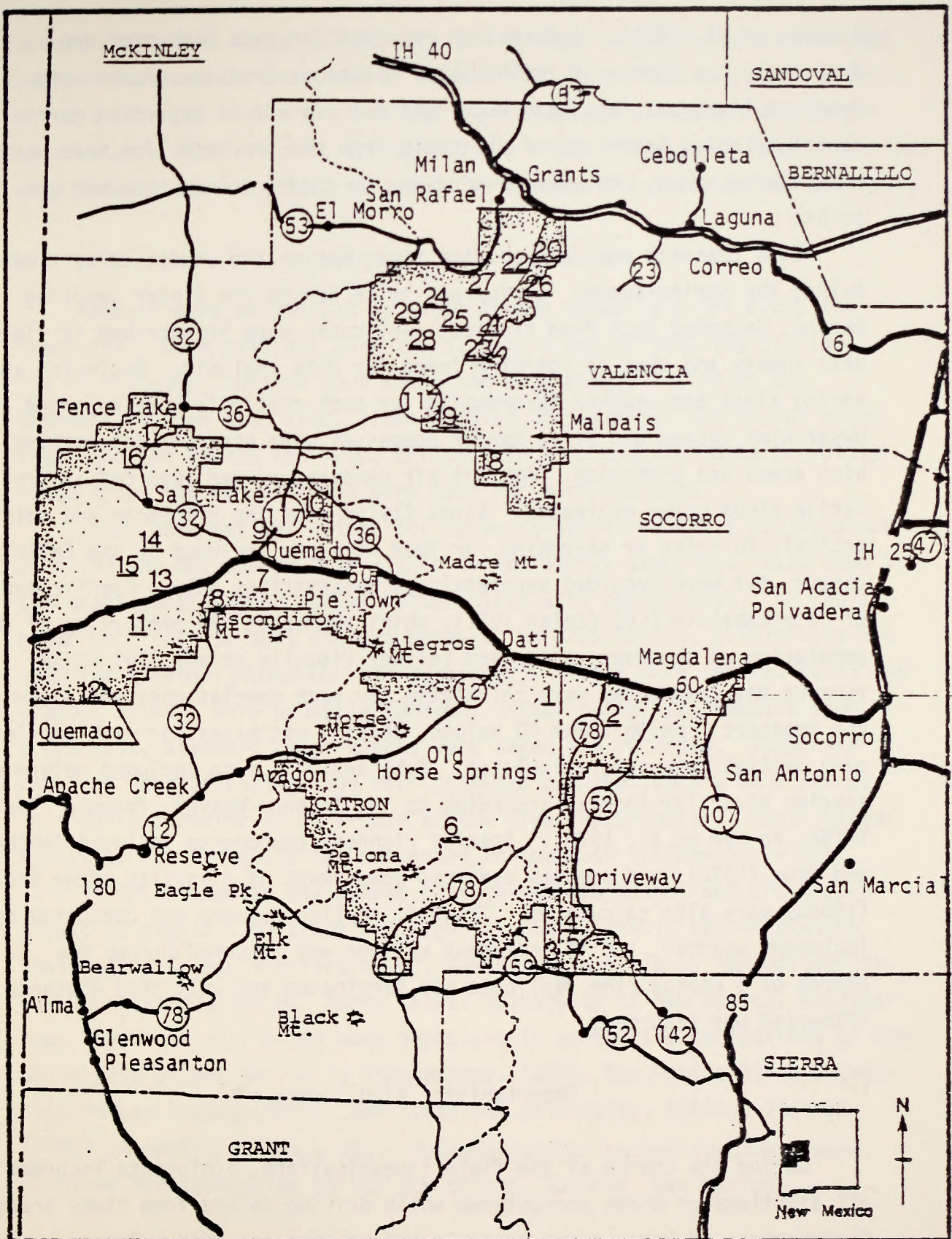


Fig. 2. Transect locations on study area.

Robbins et al. 1966). Information recorded for each bird sighting included: the number of individuals, distances from the established transect line, sex, age, and vocalizations (to aid in detecting territorial males). Estimates of distances from the transect line were verified during initial transect replicates by pacing to the observation point.

Each transect was sampled five times during the study; three times during the spring-summer period and twice during the winter sampling period. Recorded data from transect replicates were transcribed to field data sheets and then to computer forms for data analysis. Beginning and ending times and weather information for each replicate were recorded. Dwyer wind gauges and Silva Ranger compasses were used for determining wind speed and direction. Ambient air temperature was recorded and relative cloud cover estimated. Birds flying over the transects and not actively foraging or searching for food were not included in the Emlen census, but were recorded separately as observations only. Coefficients of detectability (CD) (Emlen 1971), which represent the proportion of the population an observer can detect (either visually or aurally) while running the transects, were calculated for each species observed along the transect. Using these CD values, density estimates for each species in each habitat type were calculated. Data analysis also included determining species diversity indices according to the Shannon-Weaver formula (Pielou 1966a, Bowman et al. 1970). Species richness components followed Dahlberg and Odum (1970), and species evenness components of diversity after Pielou (1966b) were also calculated. Transect replicates were not conducted during inclement weather, and if inclement weather was incurred during the course of a census, the replicate was terminated and only that distance traversed was recorded.

Opportunistic Bird Survey

During the course of the field investigations, biologists recorded all sightings of birds encountered while driving to and from study areas. Observations of raptors and their locations were recorded. Common driving routes to transect locations constituted an opportunistic bird survey route and all raptor nests and roosts sighted were recorded. On

several occasions nocturnal raptors (owls) were censused, using recorded calls in the manner described by Call (1978) to solicit responses after sunset. Unusual bird sightings and significant bird numbers of common species were also recorded throughout the study. Permanent water locations were frequented throughout the study to observe the presence of waterfowl.

Systematic Mammal Surveys

Mammals were documented by establishing trapping grids along the transects. Each grid was 20 x 750 m, with a set of sampling stations 1.5 to 5 m wide, located 50 m apart and 10 m perpendicular to the transect line on each side. Each station consisted of two Victor mouse traps and one Victor rat trap, arranged in a triangular pattern. Sixty mouse traps and 30 rat traps were used for each transect.

Traps were set and baited for three consecutive nights during summer sampling and two consecutive nights during winter sampling. Bait used in the traps consisted of peanut butter mixed with rolled oats. An anticipated bait loss to ants did not prove to be problematic, eliminating the need for dimethyl phthalate (ant deterrent). Traps were checked daily and trapped animals were promptly removed. After collecting mammals from a transect, standard measurements were taken and recorded. Temporary numbered identification tags were attached and the mammals were stored in a chilled cooler to be frozen at the first opportunity. Small mammal densities for transects are expressed in terms of capture per night. This is calculated as the number of each species caught per 270 trap nights (3 nights x 90 traps per night). Field identification of most small mammals was verified by Dr. David Schmidly, Texas A&M University, College Station, and Dr. Terry Yates, University of New Mexico, Albuquerque. Specimens collected were deposited in vertebrate collections at the University of New Mexico in Albuquerque, (UNM); New Mexico State University in Las Cruces (NMSU); and Texas A&M University, College Station (TAMU) (Appendix 3, Table 82). Representative voucher specimens were prepared for submission to the BLM office, Socorro, New Mexico.

Opportunistic Mammal Survey

The presence of bats was documented at selected localities by deploying mist nets supported by aluminum conduit poles in areas around habitat features known to attract bats (i.e., stock ponds and other water sources). In addition, nets were used near concentrations of insects around campfires. Bat colonies located, but inaccessible to netting, were recorded in biologist's field notes.

Large mammals and their sign were recorded whenever encountered. Scat, skulls and other bones, tracks and dens were recorded and/or collected to verify occurrence of larger mammals. In addition, bones of smaller mammals found in the droppings of larger mammals or birds were documented as representing the presence of that species. Several area ranchers and trappers provided additional information concerning the occurrence and abundance of larger mammals. Live traps were used on several occasions and collecting of some mammals was facilitated by the use of .22 caliber rat shot. Collecting permits were obtained from the U.S. Fish and Wildlife Service and from the New Mexico Department of Game and Fish.

Reptile and Amphibian Survey

The occurrence of reptiles and amphibians in the study area was documented by recording observations or breeding choruses of those species easily identified in the field or along the roads at night. Those species difficult to distinguish in the field were collected. Collecting methods included: the use of potato rakes for snakes, large rubber bands for stunning lizards, .22 caliber rat shot, hand collecting, a 2 m throw net and a 1.2 x 5.9 m (1.2 cm mesh) seine. Collected specimens were first fixed in a 10% formalin solution and then transferred to 60% ethanol. All reptiles and amphibians collected were deposited with the BLM District Office, Socorro, New Mexico.

Fish Survey

An attempt to document the occurrence of fish was made by sampling several stock tanks and natural seeps and springs. Sampling was conducted with a 1.2 x 5.9 m (1.2 cm mesh) seine and a 2 m throw net. Most of the naturally occurring springs and seeps were too shallow to seine or net so no samples were taken from these sites.

Special Habitat Features

Special habitat features were located and drawn on 1:24,000 topographic maps. These included raptor nesting sites, permanent water locations, roosting or nesting sites, feeding areas, prairie dog towns, snags and cliffs. Special habitat features were also located opportunistically throughout the project and several days were spent actively searching for these special features along cliffs, bluffs, canyon bottoms and dry creek washes. Topographic maps and overlays of these features were deposited in the Socorro District Office (Appendix 3, Table 83).

Special Use Areas

Special use areas were interpreted as sites of special use to wildlife, usually characterized by a special habitat feature. Wildlife activities such as breeding, drinking, hiding, and nesting were considered as special uses of an area. Special use areas were identified by various methods, verified in the field and transferred onto 1:24,000 USGS topographic map overlays. These features included watering areas, nesting areas, etc. All features were initially delineated on 1:24,000 USGS topographic maps and later transferred to mylar overlays. Topographic maps and overlays were deposited at the Socorro District Office.

RESULTS

Habitat Type Verification

BLM personnel had not completed range surveys in the Driveway, Quemado, and Malpais Planning Units when these wildlife surveys were conducted. Determination of habitat sites had been accomplished by interpretation of aerial photography and several sites had been misidentified or their classification was questionable. Because of the questionable classification of some sites in the study area, the possibility does exist that the classification of some areas where our surveys were conducted will change after range surveys are conducted. The standard habitat sites, composed of a vegetation type and land-form (physiographic type) as determined by BLM personnel, are listed in Table 2.

The number of transects for each standard habitat type was determined by the relative area of each type within the study area and its potential as wildlife habitat. As an example, *Pinus edulis/Juniperus monosperma* - Hill, and *Pinus edulis/Bouteloua gracilis* - Hill, collectively was the most common and diverse standard habitat type in the study area and was represented by 10 transects, while numerous other types represented less than 5% of the study area and were sampled by only one transect (Table 1). The number of transects per habitat type was determined by BLM personnel.

One site was obviously misidentified and was not sampled. The site was listed by BLM as a *Pinus ponderosa/Bouteloua gracilis* - Mountain (BLM Code Designation 015) and designated as Site No. 30 (Table 2). Upon inspection, the majority of the site was found to be a pinyon-juniper association and was not sampled. Excluding this site, 29 sites were sampled throughout the Quemado, Malpais and Driveway Planning Units (Table 2).

The Malpais Planning Unit was the most diverse with respect to habitat types and provided sample sites for 9 different standard habitat types (Table 2). The Driveway Planning Unit was dominated by the San Augustin Plains which are primarily grasslands. The Quemado Planning Unit was dominated by pinyon-juniper associations in hilly terrain.

Table 2. Location, description, and site number for all sites sampled in the Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico (1979)

BLM Code Designation	Vegetation Type	Physiographic Type	No. of Sites	Unit & Site No.	Location
002	<i>Xanthocephalum sarothrae/Bouteloua gracilis</i>	Hill	3	Driveway (2)	T3S R7W, Sec. 19; T3S R8N, Sec. 24 ✓
				Quemado (12)	T1S R19W, Sec. 33 ✓
				Malpais (25)	T7N R11W, Sec. 8
004	<i>Chrysothamnus nauseosus/Bouteloua gracilis</i>	Hill	2	Quemado (13)	T1N R18W, Sec. 31; T1N R19W, Sec. 36
				Malpais (29)	T1S R19W, Sec. 1 ✓
005/007	<i>Pinus edulis/Juniperus monosperma/Bouteloua gracilis</i>	Hill	10	Driveway (4)	T8S R8W, Sec. 18 & 19
				Quemado (8)	T1N R15W, Sec. 30 & 31 ✓
				Quemado (9)	T3N R15W, Sec. 27 & 28 ✓
				Quemado (10)	T2N R15W, Sec. 1 & 12 ✓
				Quemado (11)	T2S R19W, Sec. 7 ✓
				Quemado (15)	T2N R19W, Sec. 31 & 32 ✓
				Quemado (16)	T4N R19W, Sec. 14, 22, & 23 ✓
				Malpais (18)	T4N R11W, Sec. 15 & 22 ✓
				Malpais (20)	T7N R10W, Sec. 8 & 9 ✓
				Malpais (26)	T7N R10W, Sec. 3 & 4
008	<i>Pinus edulis/Bouteloua gracilis</i>	Mesa	1	Quemado (17)	T4N R18W, Sec. 6 & 7
009	<i>Pinus edulis/Juniperus monosperma</i>	Mesa	1	Malpais (23)	T6N R10W, Sec. 8 & 17
011	<i>Bouteloua gracilis/Aristida longiseta</i>	Hill	1	Driveway (5)	T8S R8W, Sec. 20 & 21
014	<i>Salsola kali/Sporobolus airoides</i>	Valley	1	Quemado (14)	T2N R19W, Sec. 27 & 28
015	<i>Pinus ponderosa/Bouteloua gracilis</i>	Mountain	1	Malpais (30)	Not established
016	<i>Atriplex canescens/Bouteloua gracilis</i>	Lacustrine Plain	1	Driveway (1)	T3S R9W, Sec. 14
018	<i>Pinus ponderosa/Bouteloua gracilis</i>	Endogenic Rock	1	Malpais (24)	T8N R12W, Sec. 26
019/020	<i>Pinus edulis/Juniperus monosperma/Bouteloua gracilis</i>	Endogenic Rock	1	Malpais (28)	T7N R12W, Sec. 7 & 18
021	<i>Juniperus monosperma/Pinus edulis</i>	Endogenic Rock	1	Malpais (27)	T8N R10W, Sec. 4 & 5
022	<i>Xanthocephalum sarothrae/Bouteloua gracilis</i>	Valley	1	Malpais (19)	T6N R11W, Sec. 32
026	<i>Pinus edulis/Fallugia paradoxa</i>	Intermittent Stream Riparian	1	Driveway (3)	T8S R8W, Sec. 30; T8S R9W, Sec. 25
031	<i>Juniperus monosperma/Fallugia paradoxa</i>	Endogenic Rock	1	Malpais (22)	T7N R10W, Sec. 7 & 8
032	<i>Atriplex canescens/Bouteloua gracilis</i>	Valley	1	Malpais (21)	T6N R10W, Sec. 6; T6N R11W, Sec. 12
034	<i>Pinus ponderosa/Pinus edulis</i>	Mountain	1	Driveway (6)	T7S R13W, Sec. 7 & 18
036	<i>Chrysothamnus nauseosus/Fallugia paradoxa</i>	Intermittent Stream Riparian	1	Quemado (7)	T1N R15W, Sec. 21 & 28

Transect Location

With the aid of BLM personnel, specific sites were selected which were felt to be representative of each standard habitat type. Specific placement and orientation was accomplished by LGL field personnel. The township, range, and section of each transect are listed in Table 2. In order to sample the portion of each site which was most representative of that standard habitat type, and because of access problems, some transects were located at or near a boundary between BLM and private or state lands. In particular, at Site No. "Driveway 4", the transect actually is situated on state land. The area represents that standard habitat type well and was easily accessible, while the adjoining BLM lands were not easily accessible without driving long distances. Exact locations of each transect were marked on USGS topographic maps, transferred to mylar overlays and submitted to the Socorro District BLM Office.

Special Habitat Features

Special habitat features were noted and evaluated throughout the entire study. Those features recognized as specific components of a habitat site that required special consideration were delineated as special habitat features. Of particular importance in this evaluation were those features which would lend themselves to special wildlife use, including breeding, nesting and concealment. Some of the special habitat features were so common and abundant that mapping of specific areas was not practical. Throughout the entire Malpais area, for example, field biologists encountered numerous sinkholes, caves, and barren lands which are all characteristic of lava flow areas. In all pinyon-juniper and ponderosa pine habitat sites, and in those areas where the presence of pinyon-juniper or ponderosa pine were evident, there were numerous snags and fallen timber which would provide nesting sites and material for many species. Kestrels (*Falco sparverius*) in particular, will use snags as nesting sites, and many rodent species utilize fallen timber for shelter and nesting areas. Therefore, it was not practical to map many of these features on the USGS topographic maps. Other special features, including those not so common, were mapped and in many instances, clarified. For example, on USGS topographical maps,

those areas which had the potential for holding temporary water were frequently mapped as areas of permanently available water. Those areas which were encountered were documented as either temporary or permanent water sources. Water sources available to stock and wildlife are both natural and man-made. Windmills and metal stock tanks were generally not available as water sources for wildlife other than birds and bats.

Earthen stock ponds fed by runoff or windmill sources are readily accessible to all wildlife. Distinction between the two types of water sources was not made on the topographic maps. Verification of windmill locations as previously marked on the topographic maps was made. Most of these water sources had been mapped before the onset of the study.

Seeps and springs were indicated on USGS topographic maps. Goat Spring, Cebollita Spring, and Cebolla Spring were the only springs found on BLM managed lands. Seeps from these springs in low areas below their source were the only seeps found in the study area. Other springs are located throughout the area but are situated on private land.

One of the most evident special habitat features was the presence of cliffs and overhangs which are used by raptor species as nesting and roosting sites. Again, mapping of all of these areas was not practical. Those areas where raptors or their nests were sighted were located on topographic maps. Bluffs and cliffs with evident "whitewash" were indicated as raptor nesting sites as were areas where suitable relief and topography were judged to provide good raptor nesting habitat.

Special Use Areas

Special use areas are frequently the same as special habitat features. As an example, cliffs and overhangs which are special habitat features and also are special use areas, provide nesting and rearing sites for raptors. Water sources of all types provide feeding and drinking areas for bats, birds, and others. Prairie dog towns provide the habitat required by black-footed ferrets. All special use areas of significance were delineated on USGS topographic maps and submitted to the Socorro District Office of the BLM.

Fish

Fish that have the potential to be affected by activities that occur on BLM lands in the Socorro District include mainly those found on BLM lands. However, fish populations located in waters downstream from BLM lands would as well be affected by the quantity and quality of water entering the streams from BLM lands, which would depend on grazing practices and other land uses. This section includes discussions of both these kinds of fish populations; emphasis is on species considered rare and/or endangered. Species are discussed in taxonomic order as listed in Table 3. Due to scarcity of permanent water sources, none of the species listed below were documented on BLM lands but all definitely occur nearby in the Gila River Drainage, including four species classed as endangered by the state.

Information for the species accounts that follow is from Koster (1957), Regan (1962), LaBounty and Minckley (1972), Behnke (1972), Parish (1975), Kinsky (1977), Gila Trout Recovery Team (1978), and Hubbard et al. (1978).

Species Accounts

Gila Trout (*Salmo gilae*)

Historical Records - High-elevation tributaries of the Upper Gila River system, including the San Francisco River. Native populations in Iron, McKenna, Source, Main Diamond, and South Diamond Creeks and transplanted populations in Sheep Corral Creek. The Gila trout is not found on BLM lands in the Socorro District.

Habitat - Cool, clear, and narrow mountain streams. Deep pools important in droughts when stream flow may slow or stop.

Special Status - Listed as endangered in New Mexico by the New Mexico State Game Commission. Listed as endangered by the U.S. Fish and Wildlife Service.

Comments - Populations found downstream from the BLM lands in the southwest portion of the Socorro District that are west of the continental divide would be affected by the quality and quantity of runoff from these lands.

Table 3. Fish that are documented or suspected to occur in the BLM Socorro District or that are located near to and downstream from BLM lands in the Socorro District.

<u>Common Name</u>	<u>Scientific Name</u>
Gila Trout	<i>Salmo gilae</i>
Rainbow Trout	<i>Salmo gairdneri</i>
Gila Sucker	<i>Catostomus insignis</i>
Rio Grande Mountain-sucker	<i>Pantosteus plebeius</i>
Gila Mountain-sucker	<i>Pantosteus clarki</i>
Carp	<i>Cyprinus carpio</i>
Goldfish	<i>Carassius auratus</i>
Roundtail Chub	<i>Gila robusta grahami</i>
Longfin Dace	<i>Agosia chrysogaster</i>
Speckled Dace	<i>Rhinichthys osculus</i>
Loach Minnow	<i>Tiaroga cobitis</i>
Spikedace	<i>Meda fulgida</i>
Channel Catfish	<i>Ictalurus punctatus</i>
Black Bullhead	<i>Ictalurus melas</i>
Mosquitofish	<i>Gambusia affinis</i>
Largemouth Black Bass	<i>Micropterus salmoides</i>
Green Sunfish	<i>Lepomis cyanellus</i>
Bluegill	<i>Lepomis macrochirus</i>

Rainbow Trout (*Salmo gairdneri*)

Historical Records - An introduced species stocked annually in many waters. Introduced into most trout streams and lakes of New Mexico. Occurrence on BLM lands in the Socorro District is possible in ponds or lakes; the species is abundant in Bluewater Lake near Grants to the north.

Habitat - A variety of habitats in warm to cool trout waters in lakes, ponds, reservoirs, and streams.

Special Status - None.

Comments - None.

Gila Sucker (*Catostomus insignis*)

Historical Records - A native fish of the Gila drainage; found in most of the large tributaries of the Upper Gila. Not found on BLM lands but located a considerable distance downstream in the Upper Gila drainage.

Habitat - Prefers the warmer waters of the Gila and San Francisco Rivers but occurs up into trout waters.

Special Status - None.

Comments - Not likely to be appreciably affected by management practices on BLM lands.

Rio Grande Mountain-sucker (*Pantosteus plebeius*)

Historical Records - Introduced to the Upper Gila basin, this species is a native of the Rio Grande and Mimbres river system.

Habitat - Occurs in the lower, warmer trout waters and for some distance further downstream in fast, rocky riffles and rocky pools.

Special Status - None.

Comments - Populations would probably not be appreciably affected by BLM land use.

Gila Mountain-sucker (*Pantosteus clarki*)

Historical Records - A native species found throughout the larger streams of the Gila and San Francisco River drainages, often penetrating to relatively high-elevation trout waters.

Habitat - Rocky, gravelly portions of the larger streams.

Special Status - None.

Comments - Some populations of this species are more likely to be affected by activities on BLM lands in the Upper Gila drainage than are populations of the previous two species, because of the closer proximity of the Gila Mountain-sucker to these BLM lands.

Carp (*Cyprinus carpio*)

Historical Records - An abundant introduced species in the warmer ponds, lakes and streams of New Mexico, this species possibly occurs in some of the ponds and lakes in the BLM Socorro District. However, we could find no documentation of its occurrence there.

Habitat - Tolerant of a great variety of conditions in lakes, ponds, canals and rivers.

Special Status - None.

Comments - Because carp are sometimes used as bait for catfish and other predatory game fish, they may have escaped to become established in reservoirs or ponds in the Socorro District where these game fish are found.

Goldfish (*Carassius auratus*)

Historical Records - Known in New Mexico (as of 1957) only from Elephant Butte Lake and from Horse Springs in the Plains of San Augustin.

Habitat - A variety of situations in streams, ponds, and lakes.

Special Status - None.

Comments - None.

Roundtail Chub (*Gila robusta grahami*)

Historical Records - Several areas of the Colorado River basin in Arizona; in New Mexico in restricted areas in the Upper Gila drainage (including possibly the San Francisco River). Located a considerable distance downstream of BLM Socorro District lands.

Habitat - Found in the larger tributaries and main streams, most commonly in the deeper pools, within their range in New Mexico. Large adults sometimes occupy very fast water.

Special Status - Listed as endangered in New Mexico by the New Mexico State Game Commission.

Comments - Probably not particularly vulnerable to effects of BLM land-use because of distance downstream from Socorro District Lands.

Longfin Dace (*Agosia chrysogaster*)

Historical Records - A widespread native of the Gila River drainage; also introduced in the Zuni and Mimbres Rivers.

Habitat - Found at low elevations in warm waters upward to cool foothill habitats.

Special Status - Not likely to be vulnerable to BLM land use on the Socorro District because it is not commonly located in the Gila River headwaters near BLM land.

Speckled Dace (*Rhinichthys osculus*)

Historical Records - A common native species in the upper Gila River drainage; especially in the high-elevation tributaries. Coexists with the Gila trout near the headwaters of the Gila River.

Habitat - Rocky streams, especially weed-filled ones.

Special Status - None.

Comments - Although not found on BLM lands, it may be relatively vulnerable to impacts of land use on BLM lands in the Gila watershed because of its proximity to these lands.

Loach Minnow (*Tiaroga cobitis*)

Historical Records - An endemic species mostly found at intermediate elevations in the Gila River drainage in New Mexico it has been found in the San Francisco River systems (including Tularosa Creek) and in the East, Middle and West Forks and the Gila.

Habitat - Locally common in rocky riffles.

Special Status - Listed as endangered in New Mexico by the New Mexico State Game Commission.

Comments - May be somewhat vulnerable to activities on BLM lands because of its proximity to and location downstream from these lands.

Spikedace (*Meda fulgida*)

Historical Records - Endemic to the Gila River basin. In New Mexico it is found in the San Francisco River and both upper and lower reaches of the Gila Rivers.

Habitat - Usually found over sandy or gravelly bottoms, concentrating in eddies and flowing areas below riffles.

Special Status - Listed as endangered in New Mexico by the New Mexico State Game Commission.

Comments - Populations in the upper reaches of the Gila drainage may be affected by land-use practices on nearby BLM land in the Socorro District.

Channel Catfish (*Ictalurus punctatus*)

Historical Records - Native to some eastern New Mexico streams and widely introduced elsewhere in the state. It may occur in some of the ponds or lakes in the Socorro District; it has been reported from Bluewater Lake near Grants.

Habitat - Found largely in a variety of streams but also sometimes in reservoirs and ponds.

Special Status - None.

Comments - None.

Black Bullhead (*Ictalurus melas*)

Historical Records - The most widely distributed of the New Mexico bullheads. It is native to the northeastern part of the state and has been widely introduced elsewhere. It may have been introduced locally in the Socorro District.

Habitat - Most often found over a mud bottom in small ponds, creeks, and canals.

Special Status - None.

Comments - None.

Mosquitofish (*Gambusia affinis*)

Historical Records - This species has been introduced in most areas of the state (a race of the species is native in the lower Pecos Valley in eastern New Mexico). Whether they are in the Socorro District is not certain, however, it is postulated that they may occur in ponds or lakes within that area.

Habitat - Found in a variety of rivers, creeks, lakes, ponds, and ditches. Mosquitofish usually avoid the current and stay in the shallows; they are adaptable to a wide range of water quality.

Special Status - None.

Comments - None.

Largemouth Black Bass (*Micropterus salmoides*)

Historical Records - This species has been planted in most suitable waters and has become established in the main rivers, creeks, and reservoirs. It is in Bluewater Lake near Grants and may occur in ponds or lakes of the Socorro District.

Habitat - A variety of warm streams, ponds, and reservoirs.

Special Status - None.

Comments - None.

Green Sunfish (*Lepomis cyanellus*)

Historical Records - Found in rivers, reservoirs, canals, ponds, and in the deeper pools of the creeks in many parts of New Mexico. Whether it occurs in the Socorro District is speculative.

Habitat - This species is adapted to a variety of flowing and non-flowing habitats in warmer waters.

Special Status - None.

Comments - None.

Bluegill (*Lepomis macrochirus*)

Historical Records - Native in the lower Pecos River in New Mexico, the bluegill has been planted over much of the state in streams and impoundments. It is speculated to have been planted in some impoundments in the Socorro District.

Habitat - A variety of situations in warmer streams, ponds, and lakes, particularly in and near aquatic vegetation.

Special Status - None.

Comments - None.

Amphibians

Amphibians in the Socorro District were found in association with permanent stock tanks and ponds, as well as temporary rain pools. Naturally occurring springs in the area would be expected to provide suitable habitat for indigenous amphibians; however, we encountered none during visits to three spring areas on or near BLM managed lands. Several species of amphibians were collected from the study area and identifications of breeding choruses provided additional documentation of species occurrence. Information provided in this report lists amphibians encountered in the study area as well as available published documentations. Species are discussed in taxonomic order as listed in Table 4. Information on identification of specimens and breeding choruses is from Stebbins (1966), Blair et al (1968), Cochran and Goin (1970), and Bernard and Brown (1977).

Species Accounts

Arizona Tiger Salamander (*Ambystoma tigrinum nebulosum*)

Historical Records - Larval and adult forms are widely distributed in temporary potholes, canyon-bottom pools, ponds, and lakes of western New Mexico. Specimens have been collected from Catron (14.6 km E of Mogollon) and Valencia (El Morro National Monument) counties.

Verified Occurrence (This Study) - Various permanent water sites throughout the study area (Appendix 1-Fig. 6).

Habitat - Potholes, ponds, and temporary pools up to at least 2438 m in elevation.

Special Status - None.

Comments - This is the only salamander that is common and widely distributed in the southwest. Tiger salamanders are found throughout the area in or near permanent water areas. Both adult and axolotls (neotenic adult forms) of the tiger salamander were collected from permanent stock ponds and small lakes in the study area. In most instances, only one form was collected or seen at a specific locality.

Table 4 . Amphibians that were documented as occurring on or immediately adjacent to the Quemado, Malpais, and Driveway Planning Units of the Socorro District, BLM. Nomenclature follows that of Bernard and Brown (1977). Maps of documented sightings are included in Appendix 1.

<u>Common Name</u>	<u>Scientific Name</u>	<u>Species Verified by this Study</u>
Arizona Tiger Salamander	<i>Ambystoma tigrinum nebulosum</i>	*
Great Basin Spadefoot	<i>Scaphiopus intermontanus</i>	
Plains Spadefoot	<i>Scaphiopus bombifrons</i>	*
Western Spadefoot	<i>Scaphiopus hammondi</i>	*
Southwestern Toad	<i>Bufo microscaphus</i>	
Woodhouse's Toad	<i>Bufo woodhousei</i>	*
Great Plains Toads	<i>Bufo cognatus</i>	
Red-spotted Toad	<i>Bufo punctatus</i>	*
Chorus Frog	<i>Pseudacris triseriata</i>	
Arizona Treefrog	<i>Hyla wrightorum</i>	
Canyon Treefrog	<i>Hyla arenicolor</i>	*
Leopard Frog	<i>Rana pipiens</i>	*
Bullfrog	<i>Rana catesbeiana</i>	

Tiger Salamander (continued)

Comments (continued)

Green Lake, near Pelona Mountain at an elevation of 2500 m, had only axolotls present, while stock tanks in Cottonwood Canyon below Green Lake and at an elevation of 2250 m, had only mature adult forms present. A permanent stock tank situated between Green Lake and the lower stock tanks, at an elevation of 2100 m, contained both adult forms. Stock tanks in the western portion of the area, near the Arizona-New Mexico state border, contained adults and many larvae. All individuals collected and observed were assigned to the subspecies *Ambystoma tigrinum nebulosum*, the Arizona Tiger Salamander.

Great Basin Spadefoot (*Scaphiopus intermontanus*)

Historical Records - A Great Basin species that extends into northwestern New Mexico. Records from El Morro National Monument.

Verified Occurrence (This Study) - Not verified.

Habitat - Near water from the shrubland/pinyon-juniper type to high elevations in the spruce-fir forests.

Special Status - None.

Comments - Probably reaches the southeastern limits of its range in or near the BLM Socorro District.

Plains Spadefoot (*Scaphiopus bombifrons*)

Historical Records - A Great Plains species whose range extends westward of the continental divide in New Mexico to include most of the state. Records from near Grants, and El Morro National Monument.

Verified Occurrence (This Study) - 2 km W of Pie Town; near Point of Rocks Canyon, approximately 16 km S of the U.S. Highway 60/State Road 78 junction; Pie Canyon; U.S. Highway 60 near Magdalena and Datil (Appendix 1-Fig. 6).

Habitat - Near permanent or temporary water sources, mostly in grassland habitats. Reported between 1950 and 2195 m elevation in northwestern New Mexico.

Plains Spadefoot (continued)

Special Status - None.

Comments - The range of this species probably overlaps that of the closely-related *Scaphiopus intermontanus* in some places in the Socorro BLM District. Also, mixed breeding choruses of *S. bombifrons* and *S. hammondi* were documented (see species account for *S. hammondi*). One specimen of *S. bombifrons* was collected from a temporary stock pond, near Pie Town on U.S. Highway 60, in Catron County. Plains spadefoot inhabit hills and river bottoms in areas of shortgrass prairies, typically in regions characterized by low rainfall. The documented occurrence of *S. bombifrons* in a pinyon-juniper association would indicate that this species might be more wide-ranging than indicated in the literature and additional collecting efforts could further document its sympatry with *S. intermontanus* and *S. hammondi*.

Western Spadefoot (*Scaphiopus hammondi*)

Historical Records - A truly southwestern species. New Mexico is the center of its range in the Southwest, and it inhabits essentially the entire state (a disjunct population exists in California). Reported from vicinity of Grants and El Morro National Monument.

Verified Occurrence (This Study) - Same locations as *S. bombifrons*, except for the Pie Town location. Also, The Narrows, approximately 34 km S of Grants; 16 km N of Pie Town, near BLM Road 2201 (Appendix 1-Fig 7).

Habitat - Widely distributed in all habitats below the spruce-fir zone; particularly common in pinyon-juniper and grassland areas. Breeds and is most usually encountered in the vicinity of rainpools, cattle tanks, roadside ditches and canyon-bottom potholes.

Special Status - None.

Comments - Specimens from lava areas are sometimes darker than adjacent populations in areas without lava. This should be the most common species of spadefoot in the Socorro BLM District. Breeding choruses of *S. hammondi* and *S. bombifrons* were heard on many occasions throughout the study area following rains in May and June (see *S. bombifrons* account for locations).

Southwestern Toad (*Bufo microscaphus*)

Historical Records - Many isolated populations, scattered in the Southwest along the headwater tributaries of the Colorado River; the populations in New Mexico appear restricted to the upper Gila River system.

Verified Occurrence (This Study) - Not verified.

Habitat - Found along rocky streams in the pinyon-juniper and ponderosa pine zones. Not dependent on rainfall to create breeding habitat.

Special Status - None.

Comments - The occurrence of these toads in the Socorro District is speculative. If populations are present they should be found west of the continental divide in the Gila River drainage.

Woodhouse's Toad (*Bufo woodhousei*)

Historical Records - A widely-distributed toad that is found in most regions of New Mexico except for parts of the southeastern quarter. Valencia County specimens have been collected near Paxton, near Grants, and near Mt. Sedgwick (Appendix 1-Fig. 7).

Verified Occurrence (This Study) - Throughout the study area.

Habitat - A variety of habitats near streams, ponds, and cattle tanks, but most common in mesic habitats above the grasslands to 2438+ m elevations.

Special Status - None.

Comments - The most common *Bufo* in pinyon-juniper habitats or above in the Socorro District.

Great Plains Toad (*Bufo cognatus*)

Historical Records - A Great Plains species that, like the plains spadefoot (*Scaphiopus bombifrons*), ranges to the west of the continental divide in the Southwest. Inhabits southern and eastern New Mexico, probably northwestward to the Socorro District.

Great Plains Toad (continued)

Verified Occurrence (This Study) - Not verified.

Habitat - Inhabits primarily grasslands, gathering in large numbers to breed in temporary rain pools or quiet streams and water-filled ditches.

Special Status - None.

Comments - The occurrence of this species in the Socorro District is speculative; if it exists there it is likely to be found in the low-elevation areas in the southeastern parts of the area.

Red-spotted Toad (*Bufo punctatus*)

Historical Records - A southwestern species, ranging throughout New Mexico in lower elevation areas. It is found in west central New Mexico mostly below 2072 m elevation.

Verified Occurrence (This Study) - The Narrows, approximately 34 km S of Grants; Malpais Lava Flow; Point of Rocks Canyon, approximately 16 km S of the U.S. Highway 60/State Road junction (Appendix 1-Fig.8).

Habitat - A toad found near temporary or permanent water in and about desert canyons, arroyos, and ponds. It congregates in large numbers to breed at localities with suitable pools of water.

Special Status - None.

Comments - Although this species has been reported to be restricted to elevations below 2000 m, it was found in the study area at elevations from about 2075 m to 2135 m in the Malpais Lava Flow. Individuals were collected in a rain pool at the BLM Campground in The Narrows during the month of June. Stebbins (1966) states that *B. punctatus* is often associated with rocks and seeks shelter in crevices. Several individuals were observed at Point of Rocks Canyon in underbrush (i.e., apache plume) and others near sandstone cliffs.

Chorus Frog (*Pseudacris triseriata*)

Historical Records - A species widely distributed in eastern North America, ranging locally westward in New Mexico in the Northern Highlands and along the Colorado Plateau.

Verified Occurrence (This Study) - Not verified.

Habitat - Grassy pools, lakes, and marshes of grasslands and mountains. Typically a species of 2134+ m elevation in New Mexico.

Special Status - None.

Comments - Few documented occurrences of this species in New Mexico exist.

Arizona Treefrog (*Hyla wrightorum*)

Historical Records - Except for an isolated population in southern Arizona, this species is restricted in the U.S. to the Mogollon Highlands in Arizona and New Mexico.

Verified Occurrence (This Study) - Not verified.

Habitat - Meadows in pinyon-juniper, ponderosa pine, and pine-fir forests above 1524 m, usually near streams.

Special Status - None.

Comments - Occurrence in the Socorro District is speculative. It is most likely to be found in the western parts of the District around the periphery of the Gila and Apache National Forests.

Canyon Treefrog (*Hyla arenicolor*)

Historical Records - A southwestern species that is found in extreme western New Mexico. Recorded from near Cebollita and near Grants, but widespread elsewhere also.

Verified Occurrence (This Study) - Near Malpais Lava Flow (Appendix 1-Fig. 8).

Habitat - Rocky canyon pools of riparian habitats at elevations where pinyon-juniper or ponderosa pine associations prevail.

Special Status - None.

Canyon Treefrog (continued)

Comments - Three *H. arenicolor* were collected from stock tanks on the southern edge of the Malpais Lava Flow. These records constitute the only documented presence of the species during the study period, although it is probable that suitable habitat occurs throughout the BLM Socorro District. Availability of water is a primary requirement for the canyon treefrog and isolated populations should be found in and around stock watering areas as well as intermittent and permanent ponds and streams.

Leopard Frog (*Rana pipiens*)

Historical Records - Probably the most widely distributed amphibian in the United States, this species occurs statewide in New Mexico. It is reportedly one of the most abundant amphibians in west-central New Mexico.

Verified Occurrence (This Study) - Throughout, near water.

Habitat - A variety of situations near and in semi-permanent or permanent water, and at all elevations to high in the mountains.

Special Status - None.

Comments - The most abundant amphibian in the BLM, Socorro District, *R. pipiens*, was found in a variety of habitats, ranging from broom snakewood-blue gramma associations on sandy soils to pinyon-juniper associations in gravelly soils. No specimens were collected since leopard frogs are readily identified visually and aurally. In areas with no available permanent water, leopard frogs are opportunistic breeders, ready to spawn in temporary rain ponds. Most stock tanks and ponds and all seeps and springs in the study area should provide more than suitable habitat for the leopard frog.

Bullfrog (*Rana catesbeiana*)

Historical Records - Ranges throughout most of the eastern United States and sporadically in the Rocky Mountain and Intermountain regions. Occurs commonly along the Rio Grande River in central New Mexico.

Bullfrog (continued)

Verified Occurrence (This Study) - Not verified.

Habitat - Highly aquatic, requiring permanent water in ponds, lakes, streams, or marshes. Occurs at mid to low elevations.

Special Status - None.

Comments - The bullfrog's occurrence in the Socorro BLM District is speculative. If it exists there, it would likely be restricted to the margins of lakes or large ponds.

Reptiles

Reptiles, like amphibians, have been studied but little in New Mexico. Additionally many species are very secretive and are seldom encountered even though they may be relatively common in an area. For these reasons the precise ranges of reptiles in New Mexico are not well delineated. This presents a special problem in determining which species occur on the BLM Socorro District, because the reported ranges of many of the species closely approach but do not include portions of the Socorro District.

The following accounts include those species reported to occur in the BLM Socorro District as well as additional species that we think occur there. Our judgements about whether species that have not been reported in the Socorro District are likely to occur there are based on how near to the area species have been reported and whether the general habitats of the species occur in the area.

These accounts describe habitats of each species so that areas can be identified where each species is likely to occur. An important habitat factor for many New Mexico reptiles is elevation; for example, many species do not occur above approximately 1676-1828 m. This is especially important relative to the Socorro District, because all the area except for a few specific sites are above 1828 m elevation. Therefore an array of reptiles not found elsewhere on the district might be found in the few low-elevation areas.

Twenty-two species of reptiles were documented during the study period. Many species are represented by only one or two observations, therefore, no attempt to estimate densities or abundance have been made. Elevations throughout the study area are typically above 1828 m, imposing restrictions on these poikilothermic organisms and thus reducing frequency and species composition in the district. Collections of reptiles were made if the species encountered was not readily identified in the field. In many instances, reptiles were collected for identification and photographed and were then released. Table 5 lists, in taxonomic order, those reptiles verified and expected to occur on the study area.

Table 5 . Reptiles that were documented as occurring on or immediately adjacent to the Quemado, Malpais, and Driveway Planning Units of the Socorro District, BLM. Nomenclature follows that of Bernard and Brown (1977). Maps of documented sightings are included in Appendix 1.

Common Name	Scientific Name	Species Verified By This Study
Lesser Earless Lizard	<i>Holbrookia maculata</i>	*
Greater Earless Lizard	<i>Holbrookia texana</i>	
Leopard Lizard	<i>Crotaphytus wislizenii</i>	*
Collared Lizard	<i>Crotaphytus collaris</i>	*
Desert Spiny Lizard	<i>Sceloporus magister</i>	*
Crevice Spiny Lizard	<i>Sceloporus poinsetti</i>	*
Eastern Fence Lizard	<i>Sceloporus undulatus</i>	*
Tree Lizard	<i>Urosaurus ornatus</i>	*
Side-blotched Lizard	<i>Uta stansburiana</i>	*
Short-horned Lizard	<i>Phrynosoma douglassi</i>	*
Round-tailed Horned Lizard	<i>Phrynosoma modestum</i>	*
Texas Horned Lizard	<i>Phrynosoma cornutum</i>	*
Great Plains Skink	<i>Eumeces obsoletus</i>	*
Many-lined Skink	<i>Eumeces multivirgatus</i>	*
Checkered Whiptail	<i>Cnemidophorus tesselatus</i>	
Western Whiptail	<i>Cnemidophorus tigris</i>	
Little Striped Whiptail	<i>Cnemidophorus inornatus</i>	
Plateau Whiptail	<i>Cnemidophorus velox</i>	*
Chihuahua Whiptail	<i>Cnemidophorus exsanguis</i>	*
Arizona Alligator Lizard	<i>Gerrhonotus kingi</i>	
Western Hognose Snake	<i>Heterodon nasicus</i>	
Ringneck Snake	<i>Diadophis punctatus</i>	
Coachwhip	<i>Masticophis flagellum</i>	*
Striped Whipsnake	<i>Masticophis taeniatus</i>	
Mountain Patch-nosed Snake	<i>Salvadora grahamiae</i>	
Gopher Snake	<i>Pituophis melanoleucus</i>	*
Glossy Snake	<i>Arizona elegans</i>	
Common Kingsnake	<i>Lampropeltis getulus</i>	
Checkered Garter Snake	<i>Thamnophis marcianus</i>	
Black-necked Garter Snake	<i>Thamnophis cyrtopsis</i>	*
Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>	*
Common Garter Snake	<i>Thamnophis sirtalis</i>	
Western Ground Snake	<i>Sonora semiannulata</i>	
Western Hook-nosed Snake	<i>Ficimia cana</i>	
Plains Black-headed Snake	<i>Tantilla nigriceps</i>	
Night Snake	<i>Hypsiglena torquata</i>	
Massasauga	<i>Sistrurus catenatus</i>	*
Black-tailed Rattlesnake	<i>Crotalus molossus</i>	
Rock Rattlesnake	<i>Crotalus lepidus</i>	
Western Rattlesnake (Prairie)	<i>Crotalus viridis</i>	*
Western Diamondback Rattlesnake	<i>Crotalus atrox</i>	

Information for the species accounts that follow is from Gehlbach (1965), Stebbins (1966), Kinsky (1977), Belfit (1978), and Scott (1978).

Species Accounts

Lesser Earless Lizard (*Holbrookia maculata*)

Historical Records - A lizard of the southern Great Plains and the Southwest. Found almost statewide in New Mexico. Records from near Grants and near Cebollita Mesa.

Verified Occurrence (This Study) - Along U.S. Highway 60 between Datil and State Road 78; approximately 20 km NW of Quemado near State Road 32 (Appendix 1-Fig. 9).

Habitat - Grassland and shrubland at middle elevations; common in exposed patches of sand or gravel such as in washes, stream banks, and sand dunes.

Special Status - None.

Comments - This lizard is probably common in the Socorro District. Several specimens of *H. maculata* were collected in sandy areas in the Driveway Planning Unit along U.S. Highway 60 and near Zuni Salt Lake, north of Quemado in sandy soil areas with scant vegetational cover. This lizard should be found throughout the area.

Greater Earless Lizard (*Holbrookia texana*)

Historical Records - A Chihuahuan Desert species. Found in southeastern New Mexico northwestward to the Rio Grande Valley south of Albuquerque. No records from the Socorro District.

Verified Occurrence (This Study) - Not verified.

Habitat - Sandy and gravelly localities within grasslands and shrublands.

Special Status - None.

Comments - Its reported range ends about the eastern limit of the Socorro District; presence in the Socorro District is hypothetical.

Leopard Lizard (*Crotaphytus wislizenii*)

Historical Records - Deserts of the western United States; statewide in New Mexico except for the northeast portion.

Verified Occurrence (This Study) - West of Pie Town; Santa Rita Mesa, S of Fence Lake (Appendix 1-Fig.9).

Habitat - Grasslands and shrublands with sparse vegetative cover.

Special Status - None.

Comments - One specimen was collected west of Pie Town in an area of rocky terrain with scattered snakeweed and some pinyon-juniper. Another individual was seen at Santa Rita Mesa, in scattered brush with little ground cover.

These two sites are above 2225 m and the presence of *C. wislizenii* at these elevations would indicate that their presence in the area is not severely restricted by higher elevations.

Collared Lizard (*Crotaphytus collaris*)

Historical Records - Southwestern United States and southern Great Plains. Almost statewide in New Mexico. Records from several localities in Valencia County.

Verified Occurrence (This Study) - Common in the study area.

Habitat - Boulder-strewn hillsides, mesa slopes, and canyons where vegetation is sparse in grassland, shrubland, and pinyon-juniper zones.

Special Status - None.

Comments - Undoubtedly this species is common locally in the Socorro District.

Desert Spiny Lizard (*Sceloporus magister*)

Historical Records - American Southwest; southwestern and northwestern New Mexico.

Verified Occurrence (This Study) - Pelona Mountain, SE of Horse Springs (Appendix 1-Fig.10).

Desert Spiny Lizard (continued)

Habitat - Pinyon-juniper, grassland, and shrubland, and riparian zones, in rocky areas or where there are trees.

Special Status - None.

Comments - One *S. magister* was observed at the entrance to Cottonwood Canyon. This area was characterized by rocky slopes and scattered pinyon-juniper on the hillsides. Ponderosa pine, cottonwoods (*Populus* sp.) and a few oaks (*Quercus* sp.) were scattered along the canyon bottoms. Both *S. magister* and *S. poinsetti* inhabit rocky situations; but *S. magister* should be found on lower mountain slopes in less rocky situations. No other observations of this lizard were recorded throughout the study period.

Crevice Spiny Lizard (*Sceloporus poinsetti*)

Historical Records - Southern New Mexico and central Texas.

Verified Occurrence (This Study) - Pelona Mountain, SE of Horse Springs; Pole Canyon, SE of Dusty (Appendix 1-Fig.10).

Habitat - Rocky canyons, gullies, hillsides and outcrops in arid and semiarid regions.

Comments - Several dead *S. poinsetti* were found in a kestrel nest in a ponderosa snag in Cottonwood Canyon. This area is characterized by steep, rocky, slopes. One individual was observed in Pole Canyon in *Pinus edulis*/*Fallugia paradoxa*, Intermittent Stream Riparian habitat.

Eastern Fence Lizard (*Sceloporus undulatus*)

Historical Records - Southern and southwestern United States; entire state of New Mexico. Records from El Morro National Monument, several locations near Grants.

Verified Occurrence (This Study) - Common in the study area.

Habitat - A variety of habitats centered in the grassland and pinyon-juniper elevational zones.

Eastern Fence Lizard (continued)

Special Status - None.

Comments - This species was one of the most abundant lizards. Observations and collections of *S. undulatus* were made primarily in areas where trees were accessible to the lizards. Several individuals were collected from trees and in fallen timber. The specimens collected showed a large degree of variation and probably represent two sub-species, *Sceloporus undulatus elongatus*, the Northern Plateau Lizard, and *Sceloporus undulatus tristichus*, the Southern Plateau Lizard.

Tree Lizard (*Urosaurus ornatus*)

Historical Records - Southwestern United States; all of New Mexico except the northeastern part. Records from south of Grants and El Morro National Monument in Valencia County.

Verified Occurrence (This Study) - See Comments.

Habitat - Mesa edges, cliffs, and trees in the ponderosa pine, pinyon-juniper, and grassland zones; also common in riparian areas.

Special Status - None.

Comments - Individuals of this species were seen only in pinyon-juniper areas on two occasions. Their ability to conceal themselves in and on trees may have contributed to these few sightings. *U. ornatus* is frequently found in areas near water, which is scarce in the area.

Side-blotched Lizard (*Uta stansburiana*)

Historical Records - Desert regions of the United States; almost statewide in New Mexico. Appears to be more common at lower elevations in west-central New Mexico. Common in eastern Valencia County.

Verified Occurrence (This Study) - Throughout the study area.

Habitat - Varied habitats in deserts, shrubland, grassland, or lower-elevation woodlands.

Special Status - None.

Side-blotched Lizard (continued)

Comments - *U. stansburiana* was the most visibly abundant lizard throughout the study area. Many individuals were seen and several collected in habitats ranging from sparse grasslands to areas of ponderosa pine. They seemed to prefer areas of loose sand with sparse vegetation, but are not restricted to these areas. Their burrows in sand and loose soil were evident in all but the most rocky situations.

Short-horned Lizard (*Phrynosoma douglassi*)

Historical Records - Western United States in the mountains and plains; northern, central, and western New Mexico. Records from the vicinity of Grants, El Morro National Monument, and other places in Valencia County.

Verified Occurrence (This Study) - Throughout the study area.

Habitat - A great variety of habitats and elevations from grassland to spruce-fir.

Special Status - None.

Comments - Short-horned lizards were the most abundant of the horned lizards found in the area. No specimens were collected but many were captured and photographed. They were present in a variety of habitats, including pinyon-juniper woodlands and ponderosa pine-oak associations at elevations above 2438 m. *P. douglassi* ranges from semiarid plains to mountains. The Zuni Mountains, north of the study area, are the type locality for the species.

Round-tailed Horned Lizard (*Phrynosoma modestum*)

Historical Records - Chihuahuan Desert, including southern and central New Mexico.

Verified Occurrence (This Study) - San Augustin Plains adjacent to US Highway 60 (Appendix 1-Fig.11).

Habitat - Lower elevations in sandy or gravelly soils of grasslands and deserts.

Special Status - None.

Round-tailed Horned Lizard (continued)

Comments - No specimens of *P. modestum* were collected during the study. Several individuals were seen in the sandy areas of the Driveway Planning Unit along U.S. Highway 60. This horned lizard is recognizable from other horned lizards in the area by its relatively small size and the lack of any fringed scales on its side. The sandy areas east of Datil may represent the only area within the study area where round-tailed horned lizards are found. Elevations in this area are from 2103 m to 2134 m.

Texas Horned Lizard (*Phrynosoma cornutum*)

Historical Records - Southern Great Plains and Chihuahuan Desert. Southern and eastern New Mexico.

Verified Occurrence (This Study) - See comments (Appendix 1-Fig. 11).

Habitat - Grasslands, shrublands, and deserts at lower elevations in varied substrate types.

Special Status - None.

Comments - One individual of this species was found in Socorro at an elevation of 1402 m to 1433 m. No individuals were encountered in the study area. *P. cornutum* is probably restricted to areas of lower elevations than found in the study area. They may occur in arid shrubland areas found throughout the Driveway Planning Unit or they may occur in the extreme eastern edge of the study area.

Great Plains Skink (*Eumeces obsoletus*)

Historical Records - Southern Great Plains and Chihuahuan Desert. Central and southeastern New Mexico. Specimens from near Grants and near Paxton in Valencia County.

Verified Occurrence (This Study) - The Narrows, approximately 34 km S of Grants (Appendix 1-Fig. 12).

Habitat - Rocky situations in shrubland and pinyon-juniper, especially among rock outcrops in arroyos and along the edges of malpais.

Special Status - None.

Great Plains Skink (continued)

Comments - This large skink reaches the northwestern limits of its range in Valencia County. It was found in loose basalt bordering the Malpais Lava Flow, near the Narrows. The area had received some moisture recently and standing pools of water were numerous along the edge of the lava. This wide ranging species probably inhabits a variety of habitats throughout the area but this single sighting constituted the only verification of the species in the area.

Many-lined Skink (*Eumeces multivirgatus*)

Historical Records - New Mexico, Arizona, and northeast into South Dakota. Statewide in New Mexico except the extreme northeast and southwest. Records from near Grants and El Morro National Monument in Valencia County.

Verified Occurrence (This Study) - The Narrows, approximately 34 km S of Grants (Appendix 1-Fig.12).

Habitat - Wide variety of situations from grassland to ponderosa pine, but most common in heavy cover in pinyon-juniper and riparian types.

Special Status - None.

Comments - Two many-lined skinks were found under a pile of moist, rotting, ponderosa pine bark, along a transect located above The Narrows. Soils in the area were sandy and shallow and some dune areas were present. This species inhabits a variety of associations and should be found in most areas.

Checkered Whiptail (*Cnemidophorus tesselatus*)

Historical Records - Chihuahuan Desert and extending into Colorado; New Mexico mostly east of the continental divide.

Verified Occurrence (This Study) - Not verified.

Habitat - Ranges from desert habitats up to the pinyon-juniper zone; prefers somewhat rocky habitats with sparse vegetation.

Special Status - None.

Checkered Whiptail (continued)

Comments - Speculated to occur on the Socorro District in the eastern parts.

Western Whiptail (*Cnemidophorus tigris*)

Historical Records - Desert regions of the United States. Central, southern and extreme northwestern New Mexico.

Verified Occurrence (This Study) - Not verified.

Habitat - Sparsely-vegetated area from grasslands up to ponderosa pine habitats.

Special Status - None.

Comments - Speculated to occur in the Socorro District in the extreme southeastern parts.

Little Striped Whiptail (*Cnemidophorus inornatus*)

Historical Records - Chihuahuan Desert region. Central, southwestern, and northwestern New Mexico.

Verified Occurrence (This Study) - Not verified.

Habitat - Chiefly a grassland species but found also up into the pinyon-juniper zone. Frequents sandy or silty ground of elevated plains or alluvial flatlands.

Special Status - None.

Comments - Occurrence in the Socorro District is speculative; it may be found in the extreme eastern parts of the District.

Plateau Whiptail (*Cnemidophorus velox*)

Historical Records - Four-corners region of New Mexico, Arizona, Utah and Colorado. Northwestern New Mexico. Records from 13 km SE of Paxton, 19.4 km S of Grants, and near Cebollita.

Verified Occurrence (This Study) - 23 km S of Fence Lake; Quemado Lake; The Narrows, approximately 34 km S of Grants (Appendix 1-Fig.13)

Habitat - Primarily in openings in pinyon-juniper areas, but also in shrubland and ponderosa pine habitats.

Plateau Whiptail (continued)

Special Status - None.

Comments - This and the next species were the most common and widespread whiptails in the Socorro District. Three specimens of *C. velox* were collected during the study. Two individuals were taken in pinyon-juniper habitats along a transect line located south of Fence Lake. Another specimen was collected at Quemado Lake, out of the study area in a ponderosa pine-oak slope. Several other individuals were seen in pinyon-juniper areas near the Malpais Lava Flow, above The Narrows.

Chihuahua Whiptail (*Cnemidophorus exsanguis*)

Historical Records - Southeastern Arizona, southwestern New Mexico, and into northern Mexico. Southwestern, south-central, and central New Mexico.

Verified Occurrence (This Study) - N of Quemado; Zuni Salt Lake; Cerro Encierro just N of Hole-in-the-Wall (Appendix 1-Fig.13).

Habitat - Primarily upland habitats from grasslands up into open areas of pinyon-juniper and ponderosa pine forests.

Special Status - None.

Comments - This and the preceding species were common in the Socorro District. This whiptail, distinguished from *C. velox* most readily by spots along its side, was found on two cinder cones north of Quemado. One individual was collected from a cinder cone at Zuni Salt Lake. Vegetation on the cinder cone was very sparse and this whiptail was concealed under small basalt pebbles. Another individual was observed in a ponderosa-pinyon association at the base of Cerro Encierro just north of Hole-in-the-Wall in the Malpais Lava Flow.

Arizona Alligator Lizard (*Gerrhonotus kingi*)

Historical Records - Southeastern Arizona, southwestern New Mexico, and southward into Mexico.

Verified Occurrence (This Study) - Not verified.

Arizona Alligator Lizard (continued)

Habitat - A mountain species that is found in rocky places near streams in pinyon-juniper, ponderosa pine, and up to spruce-fir forests.

Special Status - None.

Comments - May occur in southwestern portions of the Socorro District adjacent to the Gila and Apache National Forests.

Western Hognose Snake (*Heterodon nasicus*)

Historical Records - A Great Plains species that occurs in west to central and southwestern New Mexico and southeastern Arizona. In central New Mexico it occurs west to about the continental divide.

Verified Occurrence (This Study) - Not verified.

Habitat - Sandy or gravelly grassland and riparian situations.

Special Status - None.

Comments - Postulated to occur in the extreme eastern parts of the Socorro District.

Ringneck Snake (*Diadophis punctatus*)

Historical Records - Eastern United States, southwestern United States, and scattered locations in the West. Throughout New Mexico except for extreme northwestern New Mexico. Recorded from near Grants.

Verified Occurrence (This Study) - Not verified.

Habitat - Moist localities in grasslands, pinyon-juniper, and ponderosa pine habitats. Especially common in riparian situations.

Special Status - None.

Comments - Undoubtedly quite common on the Socorro District. Its secretive nature frequently makes it appear to be less common than it actually is.

Coachwhip (*Masticophis flagellum*)

Historical Records - Southeastern and southwestern United States. Eastern, central, and southwestern New Mexico. Recorded from Laguna and near Grants, Valencia County.

Verified Occurrence (This Study) - State Road 117 approximately 42 km S of Grants (Appendix 1-Fig.14).

Habitat - Found in various habitats, mostly at lower to middle elevations up to the pinyon-juniper zone.

Special Status - None.

Comments - This species reaches the northwestern extent of its range in New Mexico in the Zuni Mountains region. One coachwhip was observed crossing State Highway 117. At this point, the Malpais Lava Flow parallels the highway on the west and to the east is an area of flat sandy soils with heavy grass cover and some scattered shrubs up to the base of Cebolla Mesa.

Striped Whipsnake (*Masticophis taeniatus*)

Historical Records - Chihuahuan and Great Basin Deserts and vicinity. Western, central, and southern New Mexico. Recorded near Grants.

Verified Occurrence (This Study) - Not verified.

Habitat - Grassland, shrubland, and pinyon-juniper habitats, venturing locally into the ponderosa pine belt. Frequents both flatlands and mountains, especially near stream courses.

Special Status - None.

Comments - Probably common in most areas in the Socorro District.

Mountain Patch-nosed Snake (*Salvadora grahamiae*)

Historical Records - Chihuahuan Desert and adjacent areas. All of New Mexico except northern and eastern portions. Southeastern edge of the Zuni Mountains and Santa Rosa in Guadalupe County are the northern limits of its known distribution. Records from near Laguna and 16.2 km S of Grants.

Mountain patch-nosed Snake (continued)

Verified Occurrence (This Study) - Not verified.

Habitat - Inhabits rocky canyons, plateaus, and mountain slopes, chiefly above 1372 m in shrubland, pinyon-juniper, and ponderosa pine.

Special Status - None. *P-J wood/ang*

Comments - Probably locally common in the Socorro District, especially in the more southerly portions in appropriate habitats.

Gopher Snake (*Pituophis melanoleucus*)

Historical Records - Central and western United States. Throughout New Mexico. Recorded from several locations within 32.4 km S and SE of Grants, and El Morro National Monument.

Verified Occurrence (This Study) - Throughout the study area.

Habitat - Lives in a variety of habitats and elevations, but most common in pinyon-juniper, grassland, and shrubland types.

Special Status - None.

Comments - This was the most abundant snake found in the study area. Many road-killed individuals were noted during the study period. Gopher snakes were frequently seen crossing both major highways and local dirt roads. Gopher snakes do not appear to be restricted to any particular habitat types. Several individuals were collected live and photographed and road-kills in good conditions were collected as voucher specimens.

Glossy Snake (*Arizona elegans*)

Historical Records - Southern Great Plains and the southwestern deserts. All of New Mexico except west-central and north-central areas. Recorded near Madrone, Valencia County. Otherwise few records from west-central New Mexico.

Verified Occurrence (This Study) - Not verified.

Habitat - Occurs in many habitats--grassland, shrubland, shrubland, pinyon-juniper--but prefers open areas.

Glossy Snake (continued)

Special Status - None.

Comments - Likely to occur only in the extreme eastern or extreme western portions of the Socorro District at lower elevations. This species is an excellent and habitual burrower and not commonly encountered even where it is abundant.

Common Kingsnake (*Lampropeltis getulus*)

Historical Records - Southern United States. Lower elevations in southern and eastern New Mexico.

Verified Occurrence (This Study) - Not verified.

Habitat - Inhabits a variety of vegetative types, but most common in grasslands to 2133 m.

Special Status - None.

Comments - Occurrence in the Socorro District is speculative; areas where it could potentially occur are the lowest elevations near southeastern margins of the District.

Checkered Garter Snake (*Thamnophis marcianus*)

Historical Records - American Southwest. Southern and eastern New Mexico.

Verified Occurrence (This Study) - Not verified.

Habitat - A grassland species that ranges sparingly into the pinyon-juniper zone; usually occurs in riparian or stream-bed situations.

Special Status - None.

Comments - This species is likely to occur only in the extreme southeastern portions of the Socorro District at the lowest elevations.

Black-necked Garter Snake (*Thamnophis cyrtopsis*)

Historical Records - Chihuahuan Desert west to central Arizona. Western New Mexico. Recorded 18.6 km SSE of Grants, and from Acoma Indian Reservation.

Black-necked Garter Snake (continued)

Verified Occurrence (This Study) - North of The Narrows, 34 km S of Grants (Appendix 1-Fig.14).

Habitat - Variable. Commonly grasslands to the pinyon-juniper zone, usually near water.

Special Status - None.

Comments - This snake usually occurs at lower elevations than does the next species *Thamnophis elegans*, which occurs in the same geographic region. Three individuals were collected. All sightings were along State Road 117 between The Narrows and U.S. Interstate Highway 40. Two road-killed specimens were collected and another individual was seen crossing the road. All observations and collections of this species were made during, or shortly after, rain showers in the area. This species prefers wet or moist areas and may inhabit moist areas near the edge of the Malpais Lava Flow, which hold runoff rainwater.

Western Terrestrial Garter Snake (*Thamnophis elegans*)

Historical Records - Western United States. Northwestern New Mexico. Reported from near San Mateo, near Cebollita, near Paguate, El Morro National Monument, and near Grants.

Verified Occurrence (This Study) - 1 km N of US Highway 60, on Luna Road (Appendix 1-Fig.15).

Habitat - Typically semiaquatic, usually occurring near water in the pinyon-juniper zone and above, but may range from 1828 to 2743 m.

Special Status - None.

Comments - This species is likely the most abundant garter snake in the Socorro District. One specimen of *T. elegans* was collected on Luna Road in Catron County. This individual was crossing the road, which runs through an extensive prairie dog town. There was standing water from a recent rain shower in the road at the time of collection. *T. elegans* is a highly adaptable species and should be found in many

Western Terrestrial Garter Snake (continued)

Comments (continued)

associations in the area. This particular area was characterized by sparse shrubby vegetation with little or no ground cover and had been severely overgrazed.

Common Garter Snake (*Thamnophis sirtalis*)

Historical Records - Throughout most of the United States; sparingly in the Southwest. Upper and lower valleys of the Rio Grande in New Mexico to about 2438 m.

Verified Occurrence (This Study) - Not verified.

Habitat - Semiaquatic along streams, canals, and ponds in a variety of vegetational zones.

Special Status - None.

Comments - May possibly exist in lowland riparian situations in the extreme southeastern parts of the Socorro District.

Western Ground Snake (*Sonora semiannulata*)

Historical Records - Desert regions of the western United States. Southwestern New Mexico, extending up the Rio Grande Valley to about Socorro.

Verified Occurrence (This Study) - Not verified.

Habitat - River and creek valleys, sand hummocks, and rocky hillsides to about 1828 m elevation.

Special Status - None.

Comments - May extend into the Socorro District along the Alamosa Creek drainage in the extreme southeast portion.

Western Hook-nosed Snake (*Ficimia cana*)

Historical Records - Chihuahuan Desert in the United States and Mexico. Southern New Mexico up the Rio Grande Valley to about Albuquerque.

Western Hook-nosed Snake (continued)

Verified Occurrence (This Study) - Not verified.

Habitat - Grassland, shrubland, and pinyon-juniper zones in a variety of situations--rocky areas, alluvial deposits, and flats.

Special Status - None.

Comments - Secretive, therefore perhaps more widely distributed than reported. Likely to occur in the Socorro District only in the extreme eastern portions.

Plains Black-headed Snake (*Tantilla nigriceps*)

Historical Records - Southern Great Plains and into New Mexico and southeastern Arizona. Statewide in New Mexico except for the northwest portion.

Verified Occurrence (This Study) - Not verified.

Habitat - Grasslands, shrublands, and pinyon-juniper woodlands.

Special Status - None.

Comments - Secretive and perhaps more widely distributed than thought. Likely to occur only in the extreme eastern portion of the Socorro District.

Night Snake (*Hypsiglena torquata*)

Historical Records - Arid regions of the western United States. Statewide in New Mexico except in the Northern Highlands. Reported from Los Lunas in Valencia County and near Glenwood in Catron County.

Verified Occurrence (This Study) - Not verified.

Habitat - Frequents a variety of habitats in grasslands, shrublands, and pinyon-juniper zones to about 2133 m.

Special Status - None.

Comments - Probably occurs in most parts of the Socorro District.

Massasauga (*Sistrurus catenatus*)

Historical Records - Found from the Southwest northeastward to the Great Lakes. Occupies all but the northwestern one-third of New Mexico.

Verified Occurrence (This Study) - Not verified.

Habitat - Desert grassland, shrubland, and sometimes into juniper zones. Usually below 1524 m.

Special Status - None.

Comments - Possibly occurs in the extreme southeastern parts of the Socorro District where elevations are lowest.

Black-tailed Rattlesnake (*Crotalus molossus*)

Historical Records - Southwestern United States in Texas and southern New Mexico and Arizona. In New Mexico it occurs northwest to about the Zuni Mountains region. Records from Laguna and 13 km NE of Grants.

Verified Occurrence (This Study) - Approximately 6 Km E of Quemado (Appendix 1-Fig.15).

Habitat - Usually a mountain snake inhabiting rocky outcrops and stream courses and the vicinity of cliffs and rockslides from grasslands through the ponderosa pine zones.

Special Status - None.

Comments - This snake may occur throughout the Socorro District in appropriate habitats. One black-tailed rattlesnake was seen crossing US Highway 60 east of Quemado. Greasewood (*Sarcobatus vermiculatus*) is predominant in the low area immediately north of the highway with gently rolling hills to the south which were characterized by scattered juniper and large ($\frac{1}{2}$ to $1\frac{1}{2}$ m) rabbitbrush and fair ground cover.

Rock Rattlesnake (*Crotalus lepidus*)

Historical Records - Chihuahuan Desert. Found in southern New Mexico north up the Rio Grande drainage to about Socorro.

Rock Rattlesnake (continued)

Verified Occurrence (This Study) - Not verified.

Habitat - Lowlands to highlands near rocky ridges, hillsides, and gorges. Occurs to 2926 m.

Special Status - None.

Comments - Likely to occur in the Socorro District only in the extreme southeast portion.

Prairie Rattlesnake (*Crotalus viridis viridis*)

Historical Records - Western United States. Occurs throughout New Mexico. Records from near Grants, 13 km SE of Grants, 16.2 and 8 km S of Grants, Acoma Pueblo, and El Morro National Monument (Appendix 1, Fig 16).

Verified Occurrence (This Study) - Several places in study area.

Habitat - A variety of habitats at all elevations including lava flows, grasslands, shrublands, pinyon-juniper, and ponderosa pine types.

Special Status - None.

Comments - Perhaps the most common species of rattlesnake in the Socorro District, except in lower elevation grasslands where the next species *Crotalus atrox* might predominate. Only gopher snakes (*Pituophis melanoleucus*) were encountered more frequently during the study than prairie rattlesnakes. Many were seen and three individuals were collected as voucher specimens. They frequented a variety of habitats throughout the study area, including pinyon-juniper associations, shrub and grassland areas, and areas of sparse vegetation and sand dunes. In most instances, rocky terrain was present or nearby, although, several were seen and photographed in deep sandy areas along U.S. Highway 60 between Magdalena and Datil and between Pie Town and The Narrows. Observations of *C. v. viridis* were made at elevations ranging from about 2040 m to 2410 m in the study area.

Western Diamondback Rattlesnake (*Crotalus atrox*)

Historical Records - Southwestern United States. Throughout New Mexico except in extreme northern and western parts. Valencia County records from 13 km SE of Grants, 16.2 km S of Grants, 19.4 km SSE of Grants, and near San Rafael.

Verified Occurrence (This Study) - Not verified.

Habitat - A variety of habitats in the lower elevations. Especially common in the juniper association south of Grants.

Special Status - None.

Comments - Likely to be common only in the lower-elevation portions in the eastern half of the Socorro District.

Abundance and Distribution of Reptiles and Amphibians

Reptiles and amphibians were verified mainly on an opportunistic basis, with some seining for specimens in stock tanks. Density or abundance estimates were not possible, and distribution in the study area must be based on previous reports (Truett 1979) and additional sightings by LGL biologists. The verified occurrence of 21 species of reptiles and 7 species of amphibians in the study area agrees well with previous reports (Truett 1979). The Crevice Spiny Lizard was verified as occurring on the study area and this occurrence may represent a small northern range extension (Stebbins 1966). Some species were observed commonly throughout the study area in a wide variety of habitats. The more common include; Side-blotched lizard, Short-horned lizard, Gopher snake, Prairie rattlesnake, Plains spadefoot, Western spadefoot, Woodhouse's toad and the Leopard frog.

Distribution and abundance of other reptiles and amphibians is often related to availability of water and variations in elevation. Some appear to require rocky terrain or the presence of a sandy substrate, and can be found in any vegetation type where these features occur.

Mammals

The following accounts attempt to document species occurrences of and habitat use by mammals in the Socorro BLM District as reported in the literature and verified by this study. Included are only those species that have been reported to occur either within the Socorro District or in adjacent areas in habitats similar to those in the Socorro District. (It should be noted that, although most of the mammals that occur in the Socorro District are highly sedentary, some of the bats migrate annually and elk, deer, and antelope may move a number of miles between seasonal ranges).

All of the bats are highly mobile. They tend to concentrate near special habitat features (buildings, caves, ponds, streams, stands of riparian vegetation) rather than being associated with general vegetative types. Most of the species documented to occur at specific localities within or near the Socorro District would be likely to occur throughout the area at other localities with similar features.

Forty-two mammal species were documented during the study period on the three planning units surveyed. Small mammals were intensively sampled to determine relative densities and diversities for these species. The remainder of the species were documented on an opportunistic basis and densities could not be determined. Distributions of these larger species were based on sightings or sign and their relation to habitat type. Table 6 lists, in taxonomic order, mammals documented by other researchers and verified during this study.

Information for the species accounts that follow include data from Bailey (1931), Monson and Kessler (1940), Hooper (1941), Scheffer (1947), Cochrum (1960), Burt and Grossenheider (1964), Gates (1967), Larsen (1967), Lee (1967), Raught (1967), Steward (1967), Wood (1969), Findley and Caire (1974), Black (1974), Schmidly (1974), Findley et al. (1975), Turkowski and Watkins (1976), Kinsky (1977), Schmidly (1977), Hubbard et al. (1978) and Scott (1978).

Table 6. Mammals documented or expected to occur on or immediately adjacent to the Quemado, Malpais, and Driveway Planning Units of the Socorro District, BLM. Nomenclature follows that of Findley et al. (1975). Maps of documented sightings for most species are included in Appendix 1.

Common Name	Scientific Name	Species Verified by this Study
Dwarf Shrew	<i>Sorex nanus</i>	*
Yuma Myotis	<i>Myotis yumanensis</i>	
Little Brown Myotis	<i>Myotis lucifugus</i>	
Southwestern Myotis	<i>Myotis auriculus</i>	
Long-eared Myotis	<i>Myotis evotis</i>	
Fringed Myotis	<i>Myotis thysanodes</i>	
Long-legged Myotis	<i>Myotis volans</i>	
California Myotis	<i>Myotis californicus</i>	
Small-footed Myotis	<i>Myotis leibii</i>	
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	
Western Pipistrelle	<i>Pipistrellus hesperus</i>	
Big Brown Bat	<i>Eptesicus fuscus</i>	
Hoary Bat	<i>Lasiurus cinereus</i>	
Spotted Bat	<i>Euderma maculatum</i>	
Allen's Big-eared Bat	<i>Idionycteris phyllotis</i>	
Townsend's Big-eared Bat	<i>Plecotus townsendii</i>	
Pallid Bat	<i>Antrozous pallidus</i>	*
Brazilian Free-tailed Bat	<i>Tadarida brasiliensis</i>	*
Big Free-tailed Bat	<i>Tadarida macrotis</i>	
Eastern Cottontail	<i>Sylvilagus floridanus</i>	*
Desert Cottontail	<i>Sylvilagus auduboni</i>	*
Black-tailed Jackrabbit	<i>Lepus californicus</i>	*
Cliff Chipmunk	<i>Eutamias dorsalis</i>	*
Gray-collared Chipmunk	<i>Eutamias cinereicollis</i>	*
White-tailed Antelope Squirrel	<i>Ammospermophilus leucurus</i>	*
Thirteen-lined Ground Squirrel	<i>Spermophilus tridecemlineatus</i>	*
Spotted Ground Squirrel	<i>Spermophilus spilosoma</i>	*
Rock Squirrel	<i>Spermophilus variegatus</i>	*
Golden-mantled Ground Squirrel	<i>Spermophilus lateralis</i>	*
Gunnison's Prairie Dog	<i>Cynomys gunnisoni</i>	*
Abert's Squirrel	<i>Sciurus aberti</i>	*
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	*
Botta's Pocket Gopher	<i>Thomomys bottae</i>	*
Silky Pocket Mouse	<i>Perognathus flavus</i>	*
Plains Pocket Mouse	<i>Perognathus flavescens</i>	*
Ord's Kangaroo Rat	<i>Dipodomys ordii</i>	*
Banner-tailed Kangaroo Rat	<i>Dipodomys spectabilis</i>	*

Table 6. (continued)

Common Name	Scientific Name	Species Verified by this Study
Merriam's Kangaroo Rat	<i>Dipodomys merriami</i>	
Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	*
Deer Mouse	<i>Peromyscus maniculatus</i>	*
White-footed Mouse	<i>Peromyscus leucopus</i>	
Brush Mouse	<i>Peromyscus boylii</i>	*
Pinyon Mouse	<i>Peromyscus truei</i>	*
Rock Mouse	<i>Peromyscus difficilis</i>	
Northern Grasshopper Mouse	<i>Onychomys leucogaster</i>	*
Tawny-bellied Cotton Rat	<i>Sigmodon fulviventer</i>	
Southern Plains Woodrat	<i>Neotoma micropus</i>	
White-throated Woodrat	<i>Neotoma albigula</i>	*
Stephens' Woodrat	<i>Neotoma stephensi</i>	
Mexican Woodrat	<i>Neotoma mexicana</i>	
Mexican Vole	<i>Microtus mexicanus</i>	
Muskrat	<i>Ondatra zibethicus</i>	
Porcupine	<i>Erethizon dorsatum</i>	*
Coyote	<i>Canis latrans</i>	*
Kit Fox	<i>Vulpes macrotis</i>	*
Gray Fox	<i>Urocyon cinereoargenteus</i>	*
Black Bear	<i>Ursus americanus</i>	*
Ringtail	<i>Bassariscus astutus</i>	*
Long-tailed Weasel	<i>Mustela frenata</i>	*
Raccoon	<i>Procyon lotor</i>	
Black-footed Ferret	<i>Mustela nigripes</i>	
Badger	<i>Taxidea taxus</i>	*
Striped Skunk	<i>Mephitis mephitis</i>	*
Hog-nosed Skunk	<i>Conepatus mesoleucus</i>	*
Mountain Lion	<i>Felis concolor</i>	*
Bobcat	<i>Lynx rufus</i>	*
Elk	<i>Cervus elaphus</i>	*
Mule Deer	<i>Odocoileus hemionus</i>	*
White-tailed Deer	<i>Odocoileus virginianus</i>	
Pronghorn	<i>Antilocapra americana</i>	*

Species Accounts

Dwarf Shrew (*Sorex nanus*)

Historical Records - Previous records from New Mexico are limited to the Sangre de Cristo, Manzano, Sandia and Jemez Mountains and near Ruidoso.

Verified Occurrence (This Study) - One dwarf shrew male specimen was collected on 27 September 1979, in Valencia County, 22 km southeast of Ice Caves and 63 km southeast of Grants, T7N R12W, Section 18. Measurements were; total length, 100 mm; tail, 35 mm; hind foot, 9 mm; ear, 5 mm. The specimen was captured in a Victor mouse trap baited with peanut butter and oatmeal (Appendix 1-Fig.17).

Habitat - Normally found between 2150-2775 m in pine-fir forests, occasionally without free water.

Special Status - None.

Comments - The specimen was taken at the southwestern edge of the Malpais Lava Flow at approximately 2225 m elevation, in a zone of pinyon-juniper woodland interspersed with ponderosa pine and having a sparse grass and shrub understory. No free water was present. All vegetation grew on a lava flow, either on lava itself (shrubs) or in areas with a thin soil cover. Topography consisted of lava rock formed into small hills, level areas, sinkholes, and fissures.

This specimen was a very old individual. The cusps were worn sufficiently to prevent positive identification based on tooth characteristics. Identification of the specimen was verified by Dr. James S. Findley and Dr. Terry Yates (University of New Mexico) as a dwarf shrew.

Yuma Myotis (*Myotis yumanensis*)

Historical Records - Recorded from 26 km NNE of Winston, the Black Range, and the San Mateo Mountains (Appendix 1-Fig.18).

Verified Occurrence (This Study) - None

Habitat - Riparian communities of desert, grassland, and woodland between 1219-2438 m.

Yuma Myotis (continued)

Special Status - None.

Comments - A water surface forager, roosting in buildings and under bridges. Possibly migratory.

Little Brown Myotis (*Myotis lucifugus*)

Historical Records - Recorded 5 km NE of Aragon, from the Black Range, and from the San Mateo Mountains (Appendix 1-Fig.18).

Verified Occurrence (This Study) - Not verified.

Habitat - Dependent on water sources regardless of vegetation type. Concentrates near large permanent bodies of water.

Special Status - None.

Comments - Roost in buildings; probably hibernates in winter.

Southwestern Myotis (*Myotis auriculus*)

Historical Records - Southwestern and central New Mexico. Recorded from Black Range and San Mateo Mountains (Appendix 1-Fig.19).

Verified Occurrence (This Study) - Not verified.

Habitat - Abundant in yellow pine zone, especially near water.

Special Status - None.

Comments - Use caves as night roosts. Possibly migratory.

Long-eared Myotis (*Myotis evotis*)

Historical Records - Northern and western New Mexico. Specimens from Black Range and San Mateo Mountains (Appendix 1-Fig.19).

Verified Occurrence (This Study) - Not verified.

Habitat - Ponderosa pine and spruce zone, especially near water.

Special Status - None.

Comments - Roost in buildings, caves, etc.

Fringed Myotis (*Myotis thysanodes*)

Historical Records - Specimens from Black Range and San Mateo Mountains (Appendix 1-Fig.20).

Verified Occurrence (This Study) - Not verified.

Habitat - Grasslands, pinyon juniper, and ponderosa pine zones, in mountainous portions of New Mexico.

Special Status - None.

Comments - Breeding colonies occur in caves.

Long-legged Myotis (*Myotis volans*)

Historical Records - Reported from 5 km NE of Aragon, the Black Range, and the San Mateo Mountains (Appendix 1-Fig.20).

Verified Occurrence (This Study) - Not verified.

Habitat - Usually ponderosa pine zone and higher, especially near water in mountainous portions of New Mexico.

Special Status - None.

Comments - Sometimes roost in buildings. Possibly migratory.

California Myotis (*Myotis californicus*)

Historical Records - Specimens from Black Range and San Mateo Mountains (Appendix 1-Fig.21).

Verified Occurrence (This Study) - Not verified.

Habitat - Grassland and desert up through ponderosa pine zone, near cliffs and rocks in western and southern New Mexico, especially in mountains.

Special Status - None.

Comments - Usually roosts in caves, crevices, or buildings.

Small-footed Myotis (*Myotis leibii*)

Historical Records - Specimens from 36 km E of Reserve and from San Mateo Mountains (Appendix 1-Fig.21).

Small-footed Myotis (continued)

Verified Occurrence (This Study) - Not verified.

Habitat - Desert to spruce-fir zones; most common in ponderosa pine; throughout New Mexico.

Special Status - None.

Comments - Roost in buildings, under bridges, in caves and crevices. Hibernate.

Note - Myotis Bats (*Myotis* sp.)

Several species of myotis bats were noted in various locations of the study area where caves or occasionally an abandoned building provided roosts and where stock tanks or other permanent water was located nearby. Observations were made at the BLM Campground at The Narrows 34 km southeast of Grants; at the Little Narrows, approximately 28 km southeast of Grants; at Kellog Canyon approximately 24 km south of U.S. Highway 60 on State Road 78; at Point of Rocks Canyon and Sargent Canyon, approximately 32 km south of U.S. Highway 60 on State Road 78; and at Patterson Canyon, approximately 6 km northwest of Dusty. No individual species were identified since none were caught in mist nets.

Silver-haired Bat (*Lasionycteris noctivagans*)

Historical Records - Specimens from the Black Range and San Mateo Mountains (Appendix 1-Fig.22).

Verified Occurrence (This Study) - Not verified.

Habitat - High mountains in summer, lower at other times; throughout the mountainous regions of New Mexico.

Special Status - None.

Comments - Roost in trees, buildings, and in crevices. Probably migrate south in winter; may also hibernate.

Western Pipistrelle (*Pipistrellus hesperus*)

Historical Records - Specimens from San Mateo Mountains (Appendix 1-Fig.22).

Verified Occurrence (This Study) - Not verified.

Western Pipistrelle (continued)

Habitat - Usually near rock cliffs in grassland and pinyon-juniper zones.

Special Status - None.

Comments - Roost under rocks, in crevices and caves, and in buildings. Probably hibernate in winter instead of migrating.

Big Brown Bat (*Eptesicus fuscus*)

Historical Records - Specimens from 5 km NE of Aragon, 49 km N of Luna, and Black Range and the San Mateo Mountains (Appendix 1-Fig.23).

Verified Occurrence (This Study) - Not verified.

Habitat - Common in the ponderosa pine zone; less so in pinyon-juniper; almost throughout New Mexico, primarily in the mountains.

Special Status - None.

Comments - Some apparently hibernate.

Hoary Bat (*Lasiurus cinereus*)

Historical Records - Specimens from 5 km NE of Aragon, the Black Range, and the San Mateo Mountains (Appendix 1-Fig.23).

Verified Occurrence (This Study) - Not verified.

Habitat - Common in woodlands in northern New Mexico in summer; ubiquitous in migration; almost throughout New Mexico, primarily in the mountains.

Special Status - None.

Comments - Mostly males are present in summer; females migrate to northerly and easterly areas at this time.

Spotted Bat (*Euderma maculatum*)

Historical Records - Specimens from Mogollon and San Mateo Mountains (Appendix 1-Fig.24).

Verified Occurrence (This Study) - Not verified.

Spotted Bat (continued)

Habitat - Apparently pinyon-juniper, ponderosa pine, or spruce-fir woodlands near cliffs, although they may be more broadly distributed in migration; range largely unknown because few specimens have been collected.

Special Status - None.

Comments - Apparently roost in and about rock cliffs.

Allen's Big-eared Bat (*Idionycteris phyllotis*)

Historical Records - Specimens from Black Range and San Mateo and Mogollon Mountains (Appendix 1-Fig.24).

Verified Occurrence (This Study) - Not verified.

Habitat - Forested zones from (mainly) ponderosa pine to desert riparian.

Special Status - None.

Comments - None.

Townsend's Big-eared Bat (*Plecotus townsendii*)

Historical Records - Specimens from Black Range and San Mateo Mountains (Appendix 1-Fig.25).

Verified Occurrence (This Study) - Not verified.

Habitat - Found from deserts to high mountains; most common in Upper Sonoran through Transition Zones; statewide, especially in mountainous regions.

Special Status - None.

Comments - Usually found in caves, rock shelters, or mines. The only New Mexican bat that may be regularly found in winter.

Pallid Bat (*Antrozous pallidus*)

Historical Records - Specimens from 16 km NNW of Winston, the Black Range, and the San Mateo Mountains (Appendix 1-Fig.25).

Verified Occurrence (This Study) - The Narrows, 34 km S of Grants on State Road 117 (Appendix 1-Fig.25).

Pallid Bat (continued)

Habitat - Mostly deserts and grasslands but up to 2134 m in ponderosa pine, even in the absence of rocky terrain and water.

Special Status - None.

Comments - Specialized for life in arid regions; may even consume lizards and other vertebrates. Because of habitat preference it is safe to assume that this species is well distributed throughout the study area.

Brazilian Free-tailed Bat (*Tadarida brasiliensis*)

Historical Records - Specimens from 16 km N of Datil, 31 km S of Grants, the Black Range, and San Mateo Mountains (Appendix 1-Fig.26).

Verified Occurrence (This Study) - Hole-in-the-Wall, Malpais lava flow (Appendix 1-Fig.26).

Habitat - Mostly below 1828 m in pinyon-juniper woodland, desert grassland, or desert.

Special Status - None.

Comments - Roost in caves, rock fissures, buildings, etc. Females congregate in maternity colonies. One specimen was examined after it drowned in a stock tank located in a juniper-grassland situation. Elevation was approximately 2150 m. Although somewhat decomposed, the bat was readily identified.

Big Free-tailed Bat (*Tadarida macrotis*)

Historical Records - Specimens from Mogollon Mountains (Appendix 1-Fig.26).

Verified Occurrence (This Study) - Not verified.

Habitat - Variable mostly at 1828 m or lower; western New Mexico mountains.

Special Status - None.

Comments-- Similar to *Tadarida brasiliensis* in ecological requirements.

Eastern Cottontail (*Sylvilagus floridanus*)

Historical Records - Specimens from 34 km SW of Datil and 32 km SW of Magdalena (Appendix 1-Fig.27).

Verified Occurrence (This Study) - Throughout the study area.

Habitat - Pinyon-juniper zones and higher in the mountains; a variety of microhabitats.

Special Status - None.

Comments - Although Findley et al. (1975) differentiate *Sylvilagus floridanus* from *Sylvilagus auduboni* on the basis of skull characters and habitat preferences, and Burt and Grossenheider (1964) give pelage characters for the two species, we found it difficult to identify cottontails. Using the discussion from Findley et al. (1975), it is reasonable to assume that rabbits in ponderosa zones and higher are *S. floridanus*. Rabbits were common throughout the study area, with the probable exception of extensive areas of bare lava in the Malpais Lava Flow area. On the basis of the above discussion, most rabbits were probably *S. auduboni*, since their preferred habitats were the most abundant and extensive ones occurring in the study area.

While Findley et al. (1975) list a record of *S. nuttalli* from Valencia County, it is unlikely that many (if any) *S. nuttalli* occur in the study area. *S. nuttalli* is commonly a montane species of northern New Mexico.

Desert Cottontail - *Sylvilagus auduboni*

Historical Records - Specimens from near Datil, 32 km SW of Magdalena, near Magdalena, 16 km SE of Magdalena, and several locations in the San Mateo Mountains, and in the Black Range (Appendix 1-Fig.27).

Verified Occurrence (This Study) - Throughout the study area.

Habitat - Pinyon-juniper zones and lower in a variety of habitats; throughout New Mexico at lower elevations.

Special Status - None.

Comments - Replace the above species (*Sylvilagus floridanus*) at lower elevations in the same region.

Black-tailed Jackrabbit (*Lepus californicus*)

Historical Records - Specimens from near Magdalena (Appendix 1-Fig.28).

Verified Occurrence (This Study) - Throughout the study area below the ponderosa pine zone.

Habitat - Most habitats below, and occasionally within, the ponderosa pine forests. Prefers open areas; statewide.

Special Status - None.

Comments - Populations may fluctuate markedly from year to year. Jackrabbits were fairly dense in local areas, i.e., *Chrysothamnus-Bouteloua* or *Xanthocephalum-Bouteloua* habitats with level to gently rolling topography.

Cliff Chipmunk (*Eutamias dorsalis*)

Historical Records - Specimens from near Datil, Datil Mountains, Gallina Mountains, Magdalena Mountains, and San Mateo Mountains; reported also from near Cebollita Mesa (Appendix 1-Fig.28).

Verified Occurrence (This Study) - The Narrows, 34 km SE of Grants, and in various habitat types (Appendix 1-Fig.28).

Habitat - Pinyon-juniper, ponderosa pine, and spruce-fir zones, 1524-3353 m; west-central and southwestern New Mexico.

Special Status - None.

Comments - This species does not occur at higher elevations (spruce-fir) when the species *Eutamias cinereicollis* occurs on the same mountain. Although we trapped most of these chipmunks in the area around The Narrows, they were present throughout the study area in suitable habitats.

Gray-collared Chipmunk (*Eutamias cinereicollis*)

Historical Records - Specimens from 16.2 km SW of Magdalena, and Magdalena, San Mateo, and Black Mountains (Appendix 1-Fig.29).

Verified Occurrence (This Study) - Cebolla Canyon, 48 km SE of Grants; Pelona Mountain and Horse Mountain, S of Datil (Appendix 1-Fig.29).

Gray-collared Chipmunk (continued)

Habitat - Usually restricted to the spruce-fir and ponderosa pine zones; southwestern New Mexico, mostly near the Mogollon Highlands.

Special Status - None.

Comments - This species occupied ponderosa forests and higher sites.

White-tailed Antelope Squirrel (*Ammospermophilus leucurus*)

Historical Records - None reported in study area. Records of occurrence for this species in Valencia and Socorro Counties are concentrated in the eastern sections of the counties, at approximately 1550 m elevation.

Verified Occurrence (This Study) - Near the junction of U.S. Highway 60 and State Road 78 in broomweed-grama (*Xanthocephalum sarothrae*/*Bouteloua gracilis*) grassland and also near The Narrows, approximately 24 km southeast of Grants on both sides of State Road 117 in marginal pinyon-juniper (*Pinus edulis*/*Juniperus monosperma*) woodland (Appendix 1-Fig.29).

Habitat - Commonly found in level sandy areas, but also in rocky situations.

Special Status - None.

Comments - Both areas are considered typical habitats for the species and represent extensions in their range, both westward and southward from specimens examined and reported by Findley et al. (1975). The dune-grassland north of the U.S. Highway 60 and State Road 78 junction should be preferred habitat. In fact, the entire Driveway area and other marginal areas of pinyon-juniper with sandy soils are likely to be inhabited by *A. leucurus*.

Thirteen-lined Ground Squirrel (*Spermophilus tridecemlineatus*)

Historical Records - Specimens from 19.4 km NW of Datil, 16.2 km S of Beaverhead, the San Augustin Plains near Monica Spring, and 24.3 km SW of Monica Spring. Common "around the periphery of the San Augustin Plains" (Appendix 1-Fig.30).

Verified Occurrence (This Study) - 40 km S of U.S. Highway 60 on State Road 53; approximately 63 km SW of Grants T7N R13W, Section 12 (Appendix 1-Fig. 30).

Habitat - Common only in the shortgrass plains, usually in colonies. Sometimes in parks of the ponderosa pine zone.

Special Status - None.

Comments - No other investigators found this species north of the Datil Mountains in western New Mexico. The habitat, however, was the shortgrass type plains noted by Findley et al. (1975) as typical for this species.

Spotted Ground Squirrel (*Spermophilus spilosoma*)

Historical Records - Specimens from the San Augustin Plains 19.4 km NW of Monica Spring, 12.9 km SW of Magdalena, 16.2 km SE of Magdalena, and 24.3 km SE Magdalena (Appendix 1-Fig. 30).

Verified Occurrence (This Study) - 129.6 km W of Socorro, near the Very Large Array (VLA) (Appendix 1-Fig. 30).

Habitat - Arid, often sandy, grasslands.

Special Status - None.

Comments - Spotted ground squirrels were common to abundant in open grassland areas, especially where the soil was sandy.

Rock Squirrel (*Spermophilus variegatus*)

Historical Records - Specimens from 4.8 km NE of Aragon, Madre Mountain, and the San Mateo Mountains (Appendix 1-Fig. 31).

Verified Occurrence (This Study) - Pelona Mountain, SE of Horse Springs; Pole Canyon, S. of Dusty; and various other habitats, including the Malpais Lava Flow (Appendix 1-Fig. 31).

Habitat - Ubiquitous in all habitats up to the spruce-fir forest near rocky outcrops.

Special Status - None.

Comments - Rock squirrels were common in areas of broken terrain, such as boulder-strewn and rocky hillsides.

Golden-mantled Ground Squirrel (*Spermophilus lateralis*)

Historical Records - None in the study area.

Verified Occurrence (This Study) - Quemado Lake, 19 km S of the study area (Appendix 1-Fig.31).

Habitat - Montane meadows, from timberline to pinyon-juniper woodlands.

Special Status - None.

Comments - This species was observed in an open meadow. Since these ground squirrels prefer meadows in montane areas, their presence on the study area would necessarily be limited, but they may occur at Pelona Mountain southeast of Horse Springs and at the top of Cebolla Canyon southeast of The Narrows, especially since Findley et al. (1975) state that, in favored spots, they may descend into pinyon-juniper woodland.

Gunnison's Prairie Dog (*Cynomys gunnisoni*)

Historical Records - Specimens from Magdalena, 16.2 km SE of Magdalena, a location 64.8 km S and 37.3 km W of Magdalena, "San Augustin Plains", San Mateo Mountains and 38.9 km NW of Chloride. Also reported from Quemado Valley and North Plains near Cebollita Peak (Appendix 1-Fig.32).

Verified Occurrence (This Study) - Throughout the study area in grassland habitats (Appendix 1-Fig.32).

Habitat - Grasslands in plains and mountain valleys up to 3048 m.

Special Status - None.

Comments - Congregate in small, loosely organized towns. The largest town recorded was approximately 75-100 ha and was located at the junction of Luna Road and U.S. Highway 60, approximately 6 km east of Red Hill. Other towns were located in the Quemado area and at the southern end of the San Augustin Plains. Locations of all *C. gunnisoni* towns were delineated on topographic map overlays submitted to the Socorro BLM District Office.

Abert's Squirrel (*Sciurus aberti*)

Historical Records - Specimens from 13 km NW of Datil, the Datil Mountains, Jewett Gap W of the Datil Mountains, Magdalena, 45.4 km SW of Magdalena, the Magdalena Mountains and San Mateo Mountains. Also recorded on Cebollita Mesa (Appendix 1-Fig.32).

Verified Occurrence (This Study) - Pelona Mountain, SE of Horse Springs; Horse Mountain, NW of Horse Springs; Malpais Lava Flow approximately 11 km S of Ice Caves; Cerro Encierro, NW of Hole-in-the-Wall; Cebolla Canyon; approximately 56 km SE of Grants (Appendix 1-Fig.32).

Habitat - Essentially confined to forests having ponderosa pine trees, although found lower occasionally in riparian areas.

Special Status - None.

Comments - This species displays geographical color variation in New Mexico.

Red Squirrel (*Tamiasciurus hudsonicus*)

Historical Records - Specimens from the Mogollon Highlands, the San Francisco Mountains, and San Mateo Mountains. Presence on Socorro BLM District is uncertain (Appendix 1-Fig.33).

Verified Occurrence (This Study) - Approximately 31 km S of Quemado.

Habitat - Spruce-fir and sometimes adjacent ponderosa pine forests, usually above 2438 m.

Special Status - None.

Comments - This species was observed in a mixed conifer-ponderosa forest. None were seen on the study area itself, although scattered areas of marginal habitat exist on Horse Mountain, Pelona Mountain, and at the top of Cebolla Canyon near The Narrows. The lack of extensive mixed conifer habitat may prevent the red squirrel from inhabiting these areas.

Botta's Pocket Gopher (*Thomomys bottae*)

Historical Records - Specimens from 4.9 km NE of Aragon, the Datil Mountains, Madre Mountain, near Quemado, 40.5 km SW of Magdalena, 64.8 km NW of Chloride, the Gallina Mountains, near Magdalena, 22.7 km W of Magdalena, San Augustin Plains, 19.4 km NW of Monica Spring, and the San Mateo and Black Mountains (Appendix 1-Fig.33).

Verified Occurrence (This Study) - San Augustin Plains near the VLA (Appendix 1-Fig.33).

Habitat - Occupies almost every locality and elevation where suitably friable and loose soils exist.

Special Status - None.

Comments - Captures were made in grama-rabbitbrush vegetation growing on sandy soil. Burrows were present at numerous sites and in various habitat types.

Silky Pocket Mouse (*Perognathus flavus*)

Historical Records - Specimens from Quemado, the Datil Mountains, 19.4 km W of Magdalena, and several locations in the San Augustin Plains (Appendix 1-Fig.34).

Verified Occurrence (This Study) - Various locations in open grassland habitats; one approximately 18 km S of San Rafael (see transect data).

Habitat - Ubiquitous in grasslands and desert, up to open stands of pinyon-juniper; usually in loose soils.

Special Status - None.

Comments - None.

Plains Pocket Mouse (*Perognathus flavescens*)

Historical Records - Specimens from the Gallina Mountains, 24.3 km SE of Datail, and 19.4 km NW of Monica Spring (San Augustin Plains) (Appendix 1-Fig.34).

Verified Occurrence (This Study) - Not verified.

Plains Pocket Mouse (continued)

Habitat - Sandy deserts and grasslands, sometimes up into the pinyon-juniper zone.

Special Status - None.

Comments - May compete with *Perognathus flavus* on sandy sites where the two coexist.

Ord's Kangaroo Rat (*Dipodomys ordii*)

Historical Records - Specimens from 16.2 km SW Quemado, 19.4 km NW Quemado, Gallina Mountains, several locations near Magdalena, 19.4 km NW Monica Spring in the San Augustin Plains, and a location 53.5 km S and 24.3 km W of Grants in the North Plains (Appendix 1-Fig.35).

Verified Occurrence (This Study) - Numerous sites throughout the study area (see transect data).

Habitat - Occurring almost everywhere in New Mexico (up to pinyon-juniper woodland) in friable, sandy soils.

Special Status - None.

Comments - These kangaroo rats appear to be common in grasslands and lower pinyon-juniper sites. We encountered them in almost every area where the soil was suitable. Densities may range up to several hundred per acre. This species has a considerable impact on the range because of its consumption of large amounts of forage.

Banner-tailed Kangaroo Rat (*Dipodomys spectabilis*)

Historical Records - Specimens from Bear Springs Mountains, Gallina Mountains, San Mateo Mountains, several locations near Magdalena and several locations in the San Augustin Plains. Also reported from the foothills of the Datil Mountains (Appendix 1-Fig.35).

Verified Occurrence (This Study) - Numerous sites throughout the study area (see transect data).

Habitat - inhabits well-developed grasslands; prefers fairly heavy soils; widely distributed in New Mexico at the lower elevations.

Special Status - None.

Banner-tailed Kangaroo Rat (continued)

Comments - We found these kangaroo rats in areas ranging from the well-developed grasslands to areas dominated by three-awns, rabbit-brush, and juniper. They were most common in dry grassland situations. These animals may have considerable local impact on the range grasses; they construct deep and complex burrow systems that are evident as large mounds on the surface of the ground.

Merriam's Kangaroo Rat (*Dipodomys merriami*)

Historical Records - Specimens from 32.4 km NNW of Magdalena, 24.3 km N Magdalena, and the San Mateo Mountain area (Appendix 1-Fig.36).

Verified Occurrence (This Study) - Not verified.

Habitat - Warm deserts and grasslands, commonly associated with mesquite or other leguminous shrubs, frequently in stony, coarse soils.

Special Status - None.

Comments - Although this species is sympatric with *Dipodomys ordii*, the two species appear to inhabit different habitat sites and therefore do not compete extensively.

Western Harvest Mouse (*Reithrodontomys megalotis*)

Historical Records - Specimens from near Datil, several locations SW of Magdalena in the San Augustin Plains, 24.3 km N. Magdalena, the Magdalena Mountains, the San Mateo Mountains, and the North Plains about 64.8 km SSW of Grants (Appendix 1-Fig.36).

Verified Occurrence (This Study) - Various sites around Quemado (see transect data).

Habitat - Found in all habitats except the spruce-fir forests and at all elevations except the very highest northern mountains.

Special Status - None.

Comments - This species was taken in grama-rabbitbrush and alkali sacaton.

Deer Mouse (*Peromyscus maniculatus*)

Historical Records - Specimens from several locations in the San Augustin Plains SW of Magdalena and SE of Datil, locations in the North Plains SSW of Grants, 4.9 km NE of Aragon, and the Magdalena, San Mateo and Black Mountains (Appendix 1-Fig.37).

Verified Occurrence (This Study) - Throughout the study area (see transect data).

Habitat - Ubiquitous in New Mexico, especially common in the higher elevation woodlands but less common in pinyon-juniper and grasslands.

Special Status - None.

Comments - This was the most common small mammal encountered, occurring at all trap sites.

White-footed Mouse (*Peromyscus leucopus*)

Historical Records - Specimens from near Datil, about 81 km W of Belen, and the San Mateo Mountains (Appendix 1-Fig.37).

Verified Occurrence (This Study) - Not verified.

Habitat - Areas with loose or sandy soils along arroyos or in grasslands; throughout New Mexico except for the northwestern parts and higher elevations.

Special Status - None.

Comments - Commonly lives in burrows in arroyo sides or under shrubs.

Brush Mouse (*Peromyscus boylii*)

Historical Records - Specimens from near Datil and the Magdalena, San Mateo, and Black Mountains (Appendix 1-Fig.38).

Verified Occurrence (This Study) - Various sites throughout the study area (see transect data).

Habitat - Prefers dense, shrubby (usually oak) vegetation in the pinyon-juniper zone or other habitat types up to 2438 m; especially common on south-facing slopes at higher elevations, almost statewide.

Brush Mouse (continued)

Special Status - None.

Comments - May coexist with *Peromyscus truei* or other related species if brushy habitats are available. *P. boylii* appears to be well-distributed throughout the study area, primarily in the brushy areas.

Pinyon Mouse (*Peromyscus truei*)

Historical Records - Specimens from Datil, San Mateo, Magdalena, Black and Bear Springs Mountains (Appendix 1-Fig.38).

Verified Occurrence (This Study) - Various pinyon-juniper sites throughout the study area (see transect data).

Habitat - Usually found only in pinyon-juniper woodland, although occasionally found in grasslands with scattered trees or shrubs; throughout the western three-fourths of New Mexico.

Special Status - None.

Comments - This mouse was common in areas of pinyon-juniper woodland, even in the edge of the Malpais Lava Flow where pinyon-juniper grew on the lava. Some specimens had extremely large ears (up to 27 mm) in contrast to what Findley et al. (1975) state, namely that ears on these mice are shorter as one moves westward in the state.

Rock Mouse (*Peromyscus difficilis*)

Historical Records - Specimens from Datil Mountains (Appendix 1-Fig.39).

Verified Occurrence (This Study) - Not verified.

Habitat - Pinyon-juniper or oak woodlands where extensive rock-strewn areas exist. Especially common in some malpais areas. Statewide where accumulations of large rocks or boulders exist. Distribution spotty and localized.

Special Status - None.

Comments - Some of the malpais populations are dark in color.

Northern Grasshopper Mouse (*Onychomys leucogaster*)

Historical Records - Specimens from the Datil, Gallina, Bear Springs, San Mateo, and Magdalena Mountains and from several locations in

Northern Grasshopper Mouse (continued)

Historical Records (continued)

or near the San Augustin Plains south and west of Magdalena and near Monica Spring (Appendix 1-Fig.39).

Habitat - Primarily sandy grasslands or grassland/shrubland areas.

Special Status - None.

Comments - In a few areas, where the soil was heavy or hard packed, specimens were taken from roadside areas where the soil was looser. This species feeds extensively on invertebrates and small vertebrates, and may periodically be extremely abundant.

Tawny-bellied Cotton Rat (*Sigmodon fulviventer*)

Historical Records - Specimens from near Winston (Appendix 1-Fig. 40).

Verified Occurrence (This Study) - Not verified.

Habitat - Well-developed grasslands at lower elevations.

Special Status - None.

Comments - Has been replaced in recent decades in parts of its range in the Rio Grande Valley by hispid cotton rat (*Sigmodon hispidus*).

Southern Plains Woodrat (*Neotoma micropus*)

Historical Records - Specimens from Beaver Creek (Catron County) and Magdalena Mountains (Appendix 1-Fig.40).

Verified Occurrence (This Study) - Not verified.

Special Status - None.

Comments - Frequently occurs sympatrically with *Neotoma albigula*, which occupies the more rocky habitats where the two coexist.

White-throated Woodrat (*Neotoma albigula*)

Historical Records - Specimens from near Quemado, near Magdalena, and the Datil, Bear Springs, Magdalena, and San Mateo Mountains (Appendix 1-Fig.41).

White-throated Woodrat (continued)

Verified Occurrence (This Study) - Throughout the study area except for open grassland areas (see transect data).

Habitat - Found in a variety of habitats from desert to mixed coniferous forest.

Comments - We took this woodrat in habitats ranging from a sandy arroyo to a high pinyon-juniper area as well as several sites within the Malpais Lava Flow. We did not take any in the San Augustin Plains or other open grassland areas. In the state this species has developed a dark race on some of the malpais areas (e.g., at Carrizozo).

Stephens' Woodrat (*Neotoma stephensi*)

Historical Records - Specimens from near Largo Creek and near Burley (Appendix 1-Fig.41).

Verified Occurrence (This Study) - Not verified.

Habitat - Inhabits rock accumulations in the pinyon-juniper zone, although not always dependent on rocks; primarily northwestern New Mexico.

Special Status - None.

Comments - None.

Mexican Woodrat (*Neotoma mexicana*)

Historical Records - Specimens from 16.2 km SW of Quemado, near Burley and Gallina, the Datil, Magdalena, San Mateo and Black Mountains (Appendix 1-Fig.42).

Verified Occurrence (This Study) - Not verified.

Habitat - Usually a woodland species, most common in ponderosa pine and spruce-fir forests. Occasionally found below the tree zone in such habitats as boulder fields; almost statewide.

Special Status - None.

Comments - Some populations living in malpais areas are somewhat darker than other populations.

Mexican Vole (*Microtus mexicanus*)

Historical Records - Specimens from 16.2 km N of Datil Mountains, and near Cebollita, and the Datil, Madre, San Mateo, Magdalena, and Black Range Mountains (Appendix 1-Fig.42).

Verified Occurrence (This Study) - Not verified.

Habitat - Inhabits montane grasslands in ponderosa and mixed coniferous forest; may at times descend into pinyon-juniper woodlands if grass cover is good.

Special Status - None.

Comments - Where it occurs with similar species it tends to inhabit more xeric situations than does *Microtus montanus* and more non-wooded habitats than *Microtus longicaudus*.

Muskrat (*Ondatra zibethicus*)

Historical Records - Recorded from the upper Tularosa River, from San Rafael near Springs, and along canals at the western edge of the Acoma Indian Reservation west of McCartys (Appendix 1-Fig.43).

Verified Occurrence (This Study) - Not verified.

Habitat - Marshes and drainage ditches; scattered locations statewide.

Special Status - None.

Comments - No records from BLM Socorro District, but presence there judged likely.

Porcupine (*Erethizon dorsatum*)

Historical Records - Specimens from 24.3 km N of Luna, Magdalena, 22.7 km W of Magdalena, and the San Mateo Mountains (Appendix 1-Fig.43).

Verified Occurrence (This Study) - State Road 117, approximately 11 km NE of Quemado; State Road 36, approximately 37 km N of Quemado; various sites in pinyon-juniper hilly habitat (Appendix 1-Fig.43).

Habitat - Found in a wide range of habitats, including deserts and grasslands, but most common in pinyon-juniper, ponderosa pine, and spruce-fir forests; statewide.

Porcupine (continued)

Special Status - None.

Comments - The porcupine is more common and more generally present than specimen records indicate. On the study area, we found three road-killed porcupines. Throughout the hilly pinyon-juniper habitat and in higher areas, occasional girdled trees indicated presence of porcupine. Records indicate occurrence in similar habitat in other parts of the study area.

Coyote (*Canis latrans*)

Historical Records - Specimens from vicinity of Magdalena, vicinity of North Lake, and San Augustin Plains near Monica Spring, and the Datil, San Mateo, Magdalena, Gallo, and Black Range Mountains (Appendix 1-Fig. 44).

Verified Occurrence (This Study) - Throughout the study area.

Habitat - Common in all habitats.

Special Status - None.

Comments - Coyotes have been the object of intensive predator control campaigns and, in recent years, furtrapping efforts, yet remain common in all areas. Coyotes were seen on numerous occasions, primarily in open grassland, although an immature coyote was observed in a pinyon-juniper woodland. We also heard coyotes calling quite often, usually at night or during early morning hours. Scats were collected from various areas. This species appears to be well-distributed throughout the study area.

Kit Fox (*Vulpes macrotis*)

Historical Records - Specimens from 19.4 km NW of Monica Spring in the San Augustin Plains (Appendix 1-Fig. 44).

Verified Occurrence (This Study) - State Road 78 just N of Point of Rocks Canyon, approximately 19 km S of U.S. Highway 60; 3 km N of the intersection of State Road 117 and BLM Road 2201 (Appendix 1-Fig. 44).

Habitat - Grasslands, especially where large populations of rodents exist; widely distributed in western New Mexico.

Kit Fox (continued)Special Status - None.

Comments - This species may be more abundant and widely distributed than the records indicate. During the study, a kit fox was observed crossing State Road 78 in an open grassland area close to pinyon-juniper habitat. A skull and carcass was found at an abandoned camp 48 km south of Grants, near the intersection of State Road 117 and BLM Road 2201. This second site was in scattered pinyon-juniper, but the animal may have been carried there by a trapper. There were also several coyote skulls and carcasses at the same site. Open grassland is situated nearby to the south; perhaps the fox was taken from there.

Gray Fox (*Urocyon cinereoargenteus*)

Historical Records - Specimens from 35.6 km NW of Fort Tularosa in Largo Canyon, 24.3 km N of Chloride, 19.4 km N of Dusty, 64.8 km SW of Magdalena, and the Datil, Magdalena, San Mateo, and Black Range Mountains (Appendix 1-Fig.45).

Verified Occurrence (This Study) - 34 km S of U.S. Highway 60, 0.5 km E of State Road 78; approximately 13 km SE of Red Hill (Appendix 1-Fig.45).

Habitat - Most common in pinyon-juniper and adjacent habitats, especially where rock outcrops exist. Not common in unbroken grasslands or spruce-fir forests.

Special Status - None.

Comments - One gray fox skull was found at the western base of the San Mateo Mountains and two skulls were found near the study area border southeast of Red Hill. The Red Hill skulls were in a pinyon-juniper woodland, while the skull at San Mateo was in open grassland, although pinyon-juniper was relatively close by. Gray foxes should occur throughout the study area except on the San Augustin Plains (or other open grassland) or the higher areas such as Pelona Mountain or Horse Mountain.

Black Bear (*Ursus americanus*)

Historical Records - Specimens from 45.4 km S of Magdalena, 60 km S of Magdalena, and the San Mateo and Black Range Mountains (Appendix 1-Fig.45).

Verified Occurrence (This Study) - Pelona Mountain, southeast of Horse Springs; Kellog Canyon, approximately 34 km S of the U.S. Highway 60 and State Road 78 junction (Appendix 1-Fig.45).

Habitat - Montane forests from pinyon-juniper upwards; state-wide in the higher and larger mountain ranges.

Special Status - None.

Comments - Black bears are likely to inhabit all the larger ranges of mountains that surround and extend into the BLM Socorro District. Bear tracks were found on two occasions at Cottonwood Canyon, on the east side of Pelona Mountain, in ponderosa-pinyon-juniper habitat. Tracks were found in similar habitat on three occasions at Kellog Canyon. These tracks occurred both at the top of the canyon, along a ridge, and on the bottom of the canyon along the watercourse.

L. Bell (Conservation Officer, New Mexico Department of Game and Fish, personal communication) stated that a black bear was killed near Datil by New Mexico Department of Game and Fish personnel and that there were many bears in the area. J. Connor (BLM, personal communication), stated that black bears were present on Horse Mountain south of Datil.

Ringtail (*Bassariscus astutus*)

Historical Records - Documented occurrences are not abundant; specimens from the Black Range; recorded from near Cebollita Peak (Appendix 1-Fig.46).

Verified Occurrence (This Study) - Luna Road approximately 6 km S of U.S. Highway 60; Point of Rocks Canyon; approximately 33 km S of the U.S. Highway 60/State Road 78 junction; the Narrows, 34 km SE of Grants (Appendix 1-Fig.46).

Habitat - Rocky areas, canyons, and cliffs from desert habitats up to the ponderosa pine zone and possibly higher; presumably widely distributed in the mountains and other broken areas of New Mexico.

Ringtail (continued)

Special Status - None.

Comments - Ringtails are secretive animals and are often much more common than is indicated by collection records. During the study, individuals were seen along the bluffs on Luna Road and in Point of Rocks Canyon. Ringtail scat was collected at two sites in The Narrows area.

Although the abundance of ringtails on the study area could not be ascertained, the "extensive rocky areas and cliffs in grassland and woodland" that the species requires (Findley et al., 1975) are fairly abundant and ringtails may occur in many of them.

Raccoon (*Procyon lotor*)

Historical Records - Specimens from "Upper Gila River Valley" and the Magdalena Mountains.

Verified Occurrence (This Study) - Not verified.

Habitat - Common near almost all permanent waters from the desert up to timberline. They also may occur far from water; essentially statewide.

Special Status - None.

Comments - Raccoons are much more common in New Mexico than records in the literature would indicate, but none were seen in the study area.

Black-footed Ferret (*Mustela nigripes*)

Historical Records - Specimens from 16.2 km NE of San Mateo and 3.2 km N of Bluewater. Other records from 22.7 km N of Luna, 24.3 km N of Reserve, near Old Fort Wingate, and on Centerfire Creek, 16.2 km NE of Luna (Appendix 1-Fig. 46).

Verified Occurrence (This Study) - Not verified.

Habitat - Black-footed ferrets are inhabitants of prairie dog towns. In New Mexico they were known to coexist with the white-tailed prairie dog, but not commonly with the black-tailed prairie dog.

Black-footed Ferret (continued)

Special Status - Listed as endangered by the New Mexico State Game Commission and by the U.S. Fish and Wildlife Service.

Comments - No published records exist of black-footed ferrets in New Mexico in recent years. However, if populations of these animals still exist in New Mexico, portions of the BLM Socorro District are likely candidates for their occurrence.

Long-tailed Weasel (*Mustela frenata*)

Historical Records - No records from the study area. Nearest specimen from 5 km NW Albuquerque; 1 km S San Antonio and Cedar Crest, all from Bernalillo County. Also from Catron County, Mogollon Mountains, Willow Creek.

Verified Occurrence (This Study) - Specimen collected 5 km E of State Road 12, on U.S. Highway 60 (T2S R9W, Section 17). Observed 37 km SE of Grants at The Narrows (Appendix 1-Fig.47).

Habitat - Desert to alpine zones.

Special Status - None.

Comments - Long-tailed weasels were documented on the study area by a specimen collected 25 September 1979 on the San Augustin Plains by J. Connor of the BLM Socorro District. The specimen was found dead on U.S. Highway 60, 5 km east of State Road 12, T2S R9W, Section 17. A long-tailed weasel was also observed in pinyon-juniper woodland above The Narrows, approximately 37 km southeast of Grants. Various methods were employed in an attempt to collect the weasel, but all were unsuccessful.

Badger (*Taxidea taxus*)

Historical Records - Specimens from 35.6 km NW of Fort Tularosa, "Upper Gila River Valley", the San Augustin Plains near Monica Spring, Black Range, and the Magdalena Mountains (Appendix 1-Fig.47).

Verified Occurrence (This Study) - Along State Road 78 approximately 16 km S of U.S. Highway 60 (Appendix 1-Fig.47).

Habitat - Non-forested areas, especially grasslands, at all elevations. Especially common where burrowing rodents abound.

Badger (continued)

Special Status - None.

Comments - Badger sign (burrows and other excavations) is conspicuous, but badgers are relatively secretive and seldom seen. They are usually much more common than the records indicate. One badger was seen in the open along State Road 78. There were numerous badger burrows in the area. Badgers are probably fairly common in the San Augustin Plains and other open grassland areas within the study area since the habitat described by Findley et al. (1975) occurs throughout the area.

Striped Skunk (*Mephitis mephitis*)

Historical Records - Specimens from 40.5 km NW of Reserve, 97.2 km SW of U.S. Highway 60 on State Road 78, near Chloride, and the Datil, Magdalena, and Black Range mountains (Appendix 1-Fig.48).

Verified Occurrence (This Study) - Throughout the study area.

Habitat - Most common in grassland and open woodland, especially in and near agricultural areas and around man-made structures. From low desert to over 3048 m; essentially statewide.

Special Status - None.

Comments - Like most medium-sized animals that are common, the documented occurrences of striped skunks are no indication of its prevalence. Road-killed individuals were observed on numerous occasions along major highways in the study area. Apparently, this skunk is especially susceptible to highway mortality (Findley et al. 1975). The wide variety of road-kill locations suggests that this species is well distributed.

Hog-Nosed Skunks (*Conepatus mesoleucus*)

Historical Records - Specimens from the Black Range and San Mateo Mountains. Recorded also from 13 km SE of Paxton (Valencia Co.) (Appendix 1-Fig.48).

Verified Occurrence (This Study) - Various sites in open grassland habitats (Appendix 1-Fig.48).

Hog-Nosed Skunks (continued)

Habitat - Rocky terrain from desert at least to the pinyon-juniper zone. May be found in wooded areas or grasslands.

Special Status - None.

Comments - This skunk was documented by several road-killed specimens from the San Augustin Plains and from the Malpais Lava Flow area along BLM Road 2201. All were found in areas of open grassland. Similar areas are common throughout the study area and are probably occupied to some degree by these skunks.

Mountain Lion (*Felis concolor*)

Historical Records - Specimens from the Datil, Tularosa, Black Range, San Mateo, Magdalena, and Gallina Mountains (Appendix 1-Fig.49).

Verified Occurrence (This Study) - Cebolla Canyon, approximately 11 km S of The Narrows; North Pasture, just N of Cebolla Canyon; Pelona Mountain, SE of Horse Springs; Kellog Canyon, approximately 34 km S of the U.S. Highway 60/State Road 78 junction (Appendix 1-Fig.49).

Habitat - Mountainous or otherwise broken country at all elevations and in a variety of habitat types.

Special Status - None.

Comments - Individuals range widely and undoubtedly occur on many portions of the BLM Socorro District from time to time. One individual was seen at the entrance to Cebolla Canyon. In addition, a skull was found nearby in North Pasture. Mountain lion tracks were observed in Cottonwood Canyon at the Pelona Mountain transect site and tracks were seen in snow at Kellog Canyon on 11 November 1979. All observations were made in or near pinyon-juniper-ponderosa habitat with steep terrain. The distribution of observations suggests that this species may occur in other similar areas within the study area.

Bobcat (*Lynx rufus*)

Historical Records - Specimens from near Aragon, "Upper Gila River Valley", the Black Range, near Magdalena, and 29.1 km S of Grants. Recorded also from Cebollita Mesa (Valencia County) area (Appendix 1-Fig.49).

Bobcat (continued)

Verified Occurrence (This Study) - U.S. Highway 60, 16 km E of Pie Town; Kellog Canyon, approximately 34 km S of the U.S. Highway 60/ State Road 78 junction (Appendix 1-Fig.49).

Habitat - Found in almost all habitats and all elevations; especially common in broken country or brushy areas.

Special Status - None.

Comments - Bobcats are much more common and widespread than the documented records indicate. Bobcats were observed crossing U.S. Highway 60 on Cibola National Forest lands between Datil and Pie Town. Tracks were also seen in the snow on 11 November 1979 at Kellog Canyon. All sightings were in fairly rugged pinyon-juniper-ponderosa pine habitat. The species should occur in other areas with this habitat on the study area and may occur in all study area habitats.

Elk (*Cervus elaphus*)

Historical Records - Specimens from Upper Gila River and Upper San Francisco River drainage (Appendix 1-Fig.50).

Verified Occurrence (This Study) - See comments.

Habitat - Mountainous areas from pinyon-juniper to spruce-fir and above. Prefers areas with available grasslands or meadows.

Special Status - None.

Comments - Native elk (*Cervus merriami*) have disappeared from the Socorro District, but the Rocky Mountain race has been widely introduced. Their occurrence on BLM lands is not certain, but if common, probably is restricted mostly to winter when the elk move down from higher country.

Although the closest known occurrence of elk to the study area is from the Luna area, suspected elk droppings were collected at Kellog Canyon, approximately 34 km south of the U.S. Highway 60 and State Road 78 junction. Findley et al. (1975) state that parts of the San Mateo and Magdalena Mountains are suitable habitat for elk. Kellog Canyon is in the general area of suitable habitat mentioned. More positive identification is needed before the species can be documented for the study area.

Mule Deer (*Odocoileus hemionus*)

Historical Records - Specimens from the Datil, San Francisco , Black Range, and San Mateo Mountains (Appendix 1-Fig.50).

Verified Occurrence (This Study) - Various pinyon-juniper or ponderosa pine sites throughout the study area; Malpais Lava Flow, approximately 63 km southwest of Grants (Appendix 1-Fig.50).

Habitat - Shrubland and forest types at all elevations. Because mule deer are largely browsers, they are most common in areas where a variety and abundance of woody plant species occur.

Special Status - None.

Comments - In the Southwest most of the mule deer usually occur at lower elevations and white-tailed deer (*Odocoileus virginianus*) at higher elevations where the two coexist in the same mountain ranges. This is not always true, however, and the two may occupy the same habitats locally. During the study, mule deer were observed mostly in scattered to dense pinyon-juniper habitats. Topography varied from fairly level to steep hills. Deer were observed even at the western edge of the Malpais Lava Flow and bones were occasionally found on the lava in areas having pinyon-juniper or ponderosa pine vegetation.

White-tailed Deer (*Odocoileus virginianus*)

Historical Records - Specimens from San Francisco, Black Range, and San Mateo Mountains (Appendix 1-Fig.51).

Verified Occurrence (This Study) - Not verified.

Habitat - Preferred habitat is rugged chaparral-covered or encinal type (savanna) mountain slopes. A variety of browse plant species is a desirable attribute of white-tail habitat.

Special Status - None.

Comments - Generally found higher in the mountains than the preponderance of the mule deer populations, although locally the situation may be reversed. Their occurrence on BLM lands in the Socorro District is probable but uncertain.

Pronghorn (*Antilocapra americana*)

Historical Records - Grasslands and shrublands statewide.

Verified Occurrence (This Study) - Open grassland areas throughout the study area; 13 km SE of Red Hill; 29 km SE of Red Hill (Appendix 1-Fig. 51).

Habitat - Pronghorn are grassland animals, although they may occur extensively in shrubland situations, or in pinyon-juniper where an abundance of open areas exist.

Special Status - None.

Comments - Pronghorn are common in the BLM Socorro District, although no specimens from the area have found their way into museums. Although not numerous, pronghorns were frequently observed in the San Augustin Plains and in open grasslands throughout the study area. During the summer, two females were observed in pinyon-juniper woodland on the study area, and two males were observed in ponderosa pine forest just beyond the study area boundary.

Abundance and Distribution of Mammals

While the sampling methods for mammals do not provide sufficient data for abundance estimates, trends can be determined by evaluating data such as total number of mammals trapped by species (Table 7). It is evident that two of the most common rodents in the study area are the deer mouse and the pinyon mouse. Their distribution within various habitat types, however, shows that the pinyon mouse is much more restricted with respect to habitat selection than is the deer mouse. The deer mouse occurs in 16 (94%) of the 17 habitat type samples, and appears to be one of the most common mammals in west central New Mexico. The pinyon mouse is generally restricted to pinyon-dominated habitats but occurs there very commonly.

Four other species appear to be rather common in the appropriate habitat and include: Northern grasshopper mouse, brush mouse, white-throated woodrat, and spotted ground squirrel. There were nine other species, each of which was very limited in its distribution in various habitat types.

Table 7. Number of small mammals captured in snap traps during summer and winter trapping in Quemado, Driveway, and Malpais Planning Units of the Socorro District of BLM, New Mexico. Seventeen habitat types were trapped.

Species	Number of Animals Captured			Number and Percent of Habitat Types in which Animal was Trapped
	Summer	Winter	Total	
Deer Mouse	125	41	166	16 (94%)
Pinyon Mouse	59	66	125	8 (47%)
Northern Grasshopper Mouse	31	8	39	8 (47%)
Brush Mouse	9	19	28	7 (41%)
<i>Peromyscus</i> sp.	14	14	28	8 (47%)
White-throated Woodrat	16	8	24	5 (29%)
Spotted Ground Squirrel	20	0	20	3 (18%)
Silky Pocket Mouse	5	1	6	3 (18%)
Cliff Chipmunk	3	3	6	1 (6%)
Banner-tailed Kangaroo Rat	2	3	5	3 (18%)
Botta's Pocket Gopher	3	1	4	3 (18%)
Rock Squirrel	2	0	2	2 (12%)
Western Harvest Mouse	2	0	2	2 (12%)
Ord's Kangaroo Rat	1	0	1	1 (6%)
Thirteen-lined Ground Squirrel	1	0	1	1 (6%)
Dwarf Shrew	1	0	1	1 (6%)

It must be noted here that the numbers in Table 7 represent only the relative success of capture for each species during this study. This success can be influenced by many factors. Food availability for any species may influence its susceptibility to capture in baited traps. Some species are attracted to certain baits more than others, and weather (wind, rain, snow, etc.) will influence trapping of various species. The species listed in Table 7 reflect only those trapped in small snap traps.

Table 8 provides some insight into the number of species in each habitat type and a relative density index for each type, based on trap success. Pinyon-juniper combinations (BLM codes 021, 019/020) had high trap success and 4 to 6 species represented. These types were both in the lava. The ponderosa pine-blue gramma vegetation type on the lava (code 018), however, had very low trap success and only 2 species were trapped there. The type with the highest number of species was pinyon-juniper and pinyon-blue gramma, on hilly terrain (code 005/007). Trap success would suggest a medium density of mammals. The greater diversity in this type may, in part, have resulted from the greater trapping effort (10 transects) within this type. It may also reflect levels of difference in habitat quality that were not defined in the present level of delineation.

Two habitat types (other than those containing pinyon-juniper) which appeared to have relatively high small mammal densities and good diversities were: four-winged saltbush-blue gramma on a lacustrine plain (code 016) and rabbitbrush-apache plume in an intermittent stream riparian site (code 036).

The types having the lowest densities and lowest diversity were blue gramma associated with: rabbitbrush in hilly terrain (code 004), threeawn in hilly terrain (code 011), ponderosa pine on endogenic rock (code 018), four-winged saltbush in valleys (code 032), and broomweed in valleys (code 022). Other habitat types appeared to support medium density small mammal populations of 3 to 6 species.

Some small mammal species were found in several habitats on the study area. Others were very selective in habitat parameters and their presence at a particular site is indicative of certain habitat features, such as soil type or elevation. A look at which species were caught

Table 8. Trap data for summer and winter efforts, Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

BLM Code Designation	Vegetation Code	Physiographic Type	Trap Success Mammals/Trap Night (X 1000)	Number of Species Trapped
021	<i>Juniperus monosperma</i> / <i>Pinus edulis</i>	Endogenic Rock	73	4
019/020	<i>Pinus edulis</i> / <i>Juniperus</i> <i>monosperma</i> / <i>Bouteloua</i> <i>gracilis</i>	Endogenic Rock	69	6
016	<i>Atriplex canescens</i> / <i>Bouteloua gracilis</i>	Lacustrine Plain	64	6
036	<i>Chrysothamnus nauseosus</i> / <i>Fallugia paradoxa</i>	Intermittent Stream Riparian	51	5
034	<i>Pinus ponderosa</i> / <i>Pinus</i> <i>edulis</i>	Mountain	49	6
005/007	<i>Pinus edulis</i> / <i>Juniperus</i> <i>monosperma</i> / <i>Bouteloua</i> <i>gracilis</i>	Hill	46	10
026	<i>Pinus edulis</i> / <i>Fallugia</i> <i>paradoxa</i>	Intermittent Stream Riparian	44	4
031	<i>Juniperus monosperma</i> / <i>Fallugia paradoxa</i>	Endogenic Rock	33	4
008	<i>Pinus edulis</i> / <i>Bouteloua</i> <i>gracilis</i>	Mesa	33	3
002	<i>Xanthocephalum saxothrae</i> / <i>Bouteloua gracilis</i>	Hill	19	6
009	<i>Pinus edulis</i> / <i>Juniperus</i> <i>monosperma</i>	Mesa	18	2
014	<i>Salsola kali</i> / <i>Sporobolus</i> <i>airoides</i>	Valley	13	4
004	<i>Chrysothamnus nauseosus</i> / <i>Bouteloua gracilis</i>	Hill	11	5

Table 8. (continued)

BLM Code Designation	Vegetation Code	Physiographic Type	Trap Success Mammals/Trap Night (X 1000)	Number of Species Trapped
011	<i>Bouteloua gracilis</i> / <i>Aristida longiseta</i>	Hill	9	1
018	<i>Pinus ponderosa</i> / <i>Bouteloua gracilis</i>	Endogenic Rock	7	2
032	<i>Atriplex canescens</i> / <i>Bouteloua gracilis</i>	Valley	7	3
022	<i>Xanthocephalum sarothrae</i> / <i>Bouteloua gracilis</i>	Valley	4	1
015	<i>Pinus ponderosa</i> / <i>Bouteloua gracilis</i>	Mountain	Not Sampled	

in each habitat type (Table 9) can often aid in describing that type. The pinyon mouse, for example, is rarely caught far from pinyon, pinyon-juniper, or juniper associations. Of the 127 caught during this study, all but two were caught in pinyon, pinyon-juniper, or juniper associations (codes 005/007, 034, 008, 031, 009, 021, and 019/020). One was caught in ponderosa pine-blue gramma on endogenic rock (code 018) in the lava, which was very near a pinyon association, and, in fact, had some pinyon growing along the transect. Another was caught in a habitat typed as Russian thistle-alkali sacaton in a valley. This particular site was bordered by a juniper association.

The presence of a certain species of kangaroo rat in a particular habitat type might lead one to false conclusions regarding habitat parameters. While the banner-tailed kangaroo rat prefers heavier soils with dense ground cover of shrubs and grasses, and Ord's kangaroo rat prefers friable, sandy soils, they both seem to exist in small localized populations in habitats not apparently suited for their needs. The only Ord's kangaroo rat trapped during this study was trapped in a deep sandy soil with four-winged saltbush-blue gramma complex (a preferred habitat for the species); however, five banner-tailed kangaroo rates were trapped and two were caught in an intermittent stream riparian setting (code 036) which was generally rocky with occasional alluvial sand pockets. This did not appear to be optimum habitat for the banner-tailed kangaroo rat. Other species of small rodents were generally found in the habitat types known to support them.

Table 10 summarizes the observations of mammals throughout the Quemado, Driveway, and Malpais Planning Units. Indices of relative abundances by habitat type are based on observations during the entire study period and on information synthesized by Truett (1979) from several prominent, reliable sources.

One species not observed on the study area is also addressed. Red squirrels were observed on forest land near the study area boundary and similar habitat occurs nearby in the study area but no red squirrels were observed there by the field biologists.

Table 9. Small mammals trapped in the Quemado, Driveway, and Malpais Planning Units during summer and winter (1979) trapping efforts in 17 habitat types. (summer/winter)

Habitat Type	<i>Peromyscus maniculatus</i>	<i>Peromyscus truei</i>	<i>Peromyscus boylii</i>	<i>Peromyscus sp.</i>	<i>Spermophilus aplosoma</i>	<i>Spermophilus tridecemlineatus</i>	<i>Spermophilus variegatus</i>	<i>Onychomys leucogaster</i>	<i>Perognathus flavus</i>	<i>Reithrodontomys megalotis</i>	<i>Thomomys bottae</i>	<i>Sorex nanus</i>	<i>Eutamias dorsalis</i>	<i>Dipodomys ordii</i>	<i>Dipodomys spectabilis</i>	<i>Neotoma albigula</i>
005/007	61/15	48/40	1/6	5/7			1/0	1/1			2/0		3/2		1/0	8/5
004	5/0					1/0		2/0			1/0					1/0
002	2/0			1/0	7/0			8/2	4/0						0/2	
016	7/0			1/0	11/0			6/2			0/1			1/0		
026	9/3		0/2	2/0												2/2
011	1/3															
034	6/1	0/2	0/4	4/0			1/0									4/0
036	7/1		1/0					10/1		1/0					1/1	
014	0/1	0/1						3/0		1/0						
008	5/1	6/3		0/1												
022								1/1								
032	1/0							0/1	0/1							
031	0/7	2/2	0/2	2/0												
009	1/1	2/3														
018	2/0	0/1														
021	6/6	2/8	3/7						1/0							
019/020	12/2	1/6	2/0	1/4								1/0				1/1

Table 10. Index of relative abundance by habitat type for mammals observed opportunistically in the Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.
C = Common, U = Uncommon, A = Abundant.

Species	Habitat Type (BLM Code)																
	002	004	005/007	008	009	011	014	016	018	019/020	021	022	026	031	032	034	036
Myotis sp.	Common where caves, old buildings, and water occur throughout the study area.																
Pallid Bat	Common where caves, old buildings, and water occur throughout the study area.																
Brazilian free-tailed bat	Common where caves, old buildings, and water occur throughout the study area.																
Eastern Cottontail									C								C
Desert Cottontail			C	C	C					C	C		C	U			C
Black-tailed jackrabbit	C	A	U	C		C		A	U	U	U	A			C		C
Cliff Chipmunk			C	C	C				C	C	C		C	C		C	
Gray-collared Chipmunk									U								C
White-tailed Antelope Squirrel	U		C			U		C		U		U		U			
Thirteen-lined Ground Squirrel	U					U						U					
Spotted Ground Squirrel	C					C	C					C					
Rock Squirrel	C	C	C	C	C					C	C			C	C		
Golden-mantled Ground Squirrel																	U
Gunnison's Prairie Dog	C	C				C	C	C									
Abert's Squirrel									C								C
Red Squirrel	None seen on study area; could exist in habitat type 034.																
Porcupine			C		C					C	C						
Coyote	C	C	C	C	C	C		C		U	U	C	C	U		C	C
Kit Fox	U					U						U					
Gray Fox			C		C												
Black Bear			U		U												C
Ringtail			U							U					U		
Long-tailed Weasel			U		U					U	U	U					U
Badger	C					C						C					
Striped Skunk	C	C	C	C	C	C				C	C	C	C	C	C		C
Hog-nosed Skunk	C	C				C		C				C			C		
Mountain Lion			C		C												C
Bobcat			C	C													C
Elk																	U
Mule Deer			C	C	C					U	U	U		U			C
Pronghorn Antelope	C	C	U				C		C			C					

Birds

Descriptions of bird populations such that the information is useful for writing impact assessments presents problems because many bird species are migratory to some extent. They are affected by man's use of the land only during the times they are present. Those that breed, over-winter, or live year-long in an area are likely to be much more dependent on the area (and therefore more susceptible to impact from man's use of the area) than are those that only occur in transit between summer and winter ranges. The species that are transient only in the Socorro BLM District are not treated in this section because we think that information about seasonal or year-long residents is more important, and because BLM emphasized the need for information on residents (summer and winter).

In addition to the fact that different bird species use the Socorro District at different intensities, there are other problems related to describing the bird fauna. First, the number of bird species on the Socorro District exceed the number of all other vertebrates combined, and a detailed treatment of each species would be very time-consuming. Second, in contrast to the other vertebrates, most bird species inhabiting an area are relatively easily observable; this enhances the usefulness of new field investigation and decreases the relative utility of literature information. For these reasons, the bird species accounts that follow are in an abbreviated tabular format; each species is not discussed as extensively on the basis of existing data as are the other vertebrates in this report. The two most important descriptors in the following accounts are (1) the fact that a species is known to range in the vicinity of the Socorro District and (2) the habitats utilized by the species.

Information on which these species accounts were based is supplemented by data from Bailey (1928), Ligon (1961), New Mexico Department of Game and Fish (1967), and Hubbard (1978). Additional data were taken from Peterson (1961), Phillips et al. (1964), Scott and Patton (1975), Bellrose (1976), and Hubbard et al. (1978). Descriptions of species-habitat relationships were augmented by Hubbard (1965), Tatschl (1967), Wauer and Ligon (1974), and Raitt and Pimm (1974).

One hundred and forty-five bird species were verified during the study period on the three planning units surveyed in the Socorro District. The species list (180 species, Table 11) includes those species observed incidentally, verified by other researchers, and from Emlen surveys conducted along 29 transects distributed throughout the various habitat types. The Emlen technique is not appropriate for surveying certain bird groups such as waterfowl, most raptors, and nocturnal species. By recording all observations while in the study area, a more comprehensive and complete bird list (hypothetical and verified) (Appendix 3-Table 84) was possible.

Emlen transects were run (3 replicates in summer and 2 replicates in winter) at 29 sites (Fig. 2) by LGL personnel and at 5 sites by BLM personnel, for the purpose of determining densities of bird species in each habitat type. Due to the nature of the Emlen method, density estimates can be made only if a species is detected in the first census strip. Therefore, if a species is detected in strip 2, 3, 4, but not in 1, no density estimate can be made, but occurrence of that species is verified. In order to make the overall survey more meaningful, and to expand the data to be representative of much larger areas, the densities derived from two or three replicates of each transect were averaged. In habitat types where more than one transect was run, the estimated densities were further averaged to include all transects.

In averaging the data from more than one replicate, and, in some cases, more than one transect, each with more than one replicate, certain problems were encountered. Since estimated density computations were not always possible on every replicate of every transect, means were not always computed using the same number of replicates. Only the replicates where estimated densities were calculated were used in computing mean densities. Estimated densities and coefficient of detectability (CD) values for each species by replicate is shown in Tables 48 to 81 (Appendix 2).

Bird Densities by Transect and Habitat Type

Habitat type *Xanthocephalum sarothrae/Bouteloua gracilis* - Hill (code 002) was inventoried for summer and winter resident birds along three transects (Sites No. 2, 12, and 25). Mean estimated densities

Table 11. Birds that were documented as occurring in the Quemado, Malpais, and the Driveway Planning Units of the Socorro District, BLM, New Mexico by LGL Biologists. Nomenclature follows American Ornithologists' Union (1957, 1973a, 1973b, 1976).

Common Name	Scientific Name
<i>Anseriformes</i>	
Mallard <i>H</i>	<i>Anas platyrhynchos</i>
Pintail <i>H</i>	<i>Anas acuta</i>
American Wigeon <i>H</i>	<i>Anas americana</i>
Blue-winged Teal <i>H</i>	<i>Anas discors</i>
Cinnamon Teal <i>H</i>	<i>Anas cyanoptera</i>
Ruddy Duck <i>H</i>	<i>Oxyura jamaicensis</i>
<i>Falconiformes</i>	
Turkey Vulture <i>O</i>	<i>Cathartes aura</i>
Goshawk <i>H</i>	<i>Accipiter gentilis</i>
Cooper's Hawk <i>O</i>	<i>Accipiter cooperii</i>
Sharp-shinned Hawk <i>O</i>	<i>Accipiter striatus</i>
Marsh Hawk <i>O</i>	<i>Circus cyaneus</i>
Rough-legged Hawk <i>O</i>	<i>Buteo lagopus</i>
Ferruginous Hawk <i>O</i>	<i>Buteo regalis</i>
Red-tailed Hawk <i>O</i>	<i>Buteo jamaicensis</i>
Swainson's Hawk <i>H</i>	<i>Buteo swainsoni</i>
Golden Eagle <i>O</i>	<i>Aquila chrysaetos</i>
Bald Eagle <i>O</i>	<i>Haliaeetus leucocephalus</i>
Prairie Falcon <i>O</i>	<i>Falco mexicanus</i>
Peregrine Falcon <i>H</i>	<i>Falco peregrinus</i>
Merlin <i>O</i>	<i>Falco columbarius</i>
American Kestrel <i>O</i>	<i>Falco sparverius</i>
<i>Galliformes</i>	
Scaled Quail <i>O</i>	<i>Callipepla squamata</i>
Gambel's Quail <i>O</i>	<i>Lophortyx gambelii</i>
<i>Ciconiiformes</i>	
Cattle Egret <i>H</i>	<i>Bubulcus ibis</i>
<i>Gruiformes</i>	
American Coot <i>H</i>	<i>Fulica americana</i>
<i>Charadriiformes</i>	
American Avocet <i>H</i>	<i>Recurvirostra americana</i>
Killdeer <i>O</i>	<i>Charadrius vociferus</i>
Mountain Plover <i>H</i>	<i>Charadrius montanus</i>
<i>Columbiformes</i>	
Band-tailed Pigeon <i>H</i>	<i>Columba fasciata</i>
Mourning Dove <i>O</i>	<i>Zenaida macroura</i>

Table 11. (continued)

Common Name	Scientific Name
<i>Cuculiformes</i>	
Roadrunner	<i>Geococcyx californianus</i>
<i>Strigiformes</i>	
Screech Owl	<i>Otus asio</i>
Great Horned Owl	<i>Bubo virginianus</i>
Barn Owl	<i>Tyto alba</i>
Burrowing Owl	<i>Athene cunicularia</i>
Flammulated Owl	<i>Otus flammeolus</i>
<i>Caprimulgiformes</i>	
Common Nighthawk	<i>Chordeiles minor</i>
Lesser Nighthawk	<i>Chordeiles acutipennis</i>
<i>Apodiformes</i>	
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>
Black-chinned Hummingbird	<i>Archilochus alexandri</i>
Rufous Hummingbird	<i>Selasphorus rufus</i>
<i>Coraciiformes</i>	
Belted Kingfisher	<i>Megasceryle alcyon</i>
<i>Piciformes</i>	
Common Flicker	<i>Colaptes auratus</i>
Ladder-backed Woodpecker	<i>Picoides scalaris</i>
Acorn Woodpecker	<i>Melanerpes formicivorus</i>
Lewis' Woodpecker	<i>Melanerpes lewis</i>
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>
Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>
Hairy Woodpecker	<i>Picoides villosus</i>
Downy Woodpecker	<i>Picoides pubescens</i>
<i>Passeriformes</i>	
Eastern Kingbird	<i>Tyrannus tyrannus</i>
Western Kingbird	<i>Tyrannus verticalis</i>
Cassin's Kingbird	<i>Tyrannus vociferans</i>
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>
Say's Phoebe	<i>Sayornis saya</i>
Dusky Flycatcher	<i>Empidonax oberholseri</i>
Gray Flycatcher	<i>Empidonax wrightii</i>
Western Wood Pewee	<i>Contopus sordidulus</i>
Olive-sided Flycatcher	<i>Nuttallornis borealis</i>
Horned Lark	<i>Eremophila alpestris</i>
Barn Swallow	<i>Hirundo rustica</i>
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
Violet-green Swallow	<i>Tachycineta thalassina</i>
Rough-winged Swallow	<i>Stelgidopteryx ruficollis</i>
Purple Martin	<i>Progne subis</i>
Steller's Jay	<i>Cyanocitta stelleri</i>
Scrub Jay	<i>Aphelocoma coerulescens</i>
Mexican Jay	<i>Aphelocoma ultramarina</i>

Table 11. (continued)

Common Name	Scientific Name
Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>
Common Raven	<i>Corvus corax</i>
Common Crow	<i>Corvus brachyrhynchos</i>
Black-capped Chickadee	<i>Parus atricapillus</i>
Mountain Chickadee	<i>Parus gambellii</i>
Plain Titmouse	<i>Parus inornatus</i>
Common Bushtit	<i>Psaltiriparus minimus</i>
White-breasted Nuthatch	<i>Sitta carolinensis</i>
Red-breasted Nuthatch	<i>Sitta canadensis</i>
Brown Creeper	<i>Certhia familiaris</i>
House Wren	<i>Troglodytes aedon</i>
Bewick's Wren	<i>Thryomanes bewickii</i>
Rock Wren	<i>Salpinctes obsoletus</i>
Canyon Wren	<i>Catherpes mexicanus</i>
Mockingbird	<i>Mimus polyglottos</i>
Bendire's Thrasher	<i>Toxostoma bendirei</i>
Curve-billed Thrasher	<i>Toxostoma curvirostre</i>
American Robin	<i>Turdus migratorius</i>
Townsend's Solitaire	<i>Myadestes townsendi</i>
Hermit Thrush	<i>Catharus guttata</i>
Western Bluebird	<i>Sialia mexicana</i>
Mountain Bluebird	<i>Sialia currucoides</i>
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>
Ruby-crowned Kinglet	<i>Regulus calendula</i>
Cedar Waxwing	<i>Bombycilla cedrorum</i>
Northern Shrike	<i>Lanius excubitor</i>
Loggerhead Shrike	<i>Lanius ludovicianus</i>
Starling	<i>Sturnus vulgaris</i>
Gray Vireo	<i>Vireo vicinior</i>
Solitary Vireo	<i>Vireo solitarius</i>
Bell's Vireo	<i>Vireo bellii</i>
Orange-crowned Warbler	<i>Vermivora celata</i>
Lucy's Warbler	<i>Vermivora luciae</i>
Yellow-rumped Warbler	<i>Dendroica coronata</i>
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>
Grace's Warbler	<i>Dendroica graciae</i>
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>
Ovenbird	<i>Seiurus aurocapillus</i>
MacGillivray's Warbler	<i>Oporornis tolmiei</i>
Wilson's Warbler	<i>Wilsonia pusilla</i>
Red-faced Warbler	<i>Cardellina rubrifrons</i>
House Sparrow	<i>Passer domesticus</i>
Eastern Meadowlark	<i>Sturnella magna</i>
Western Meadowlark	<i>Sturnella neglecta</i>
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</i>

Table 11. (continued)

Common Name	Scientific Name
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>
Brown-headed Cowbird	<i>Molothrus ater</i>
Scott's Oriole	<i>Icterus parisorum</i>
Northern Oriole	<i>Icterus galbula</i>
Western Tanager	<i>Piranga ludoviciana</i>
Hepatic Tanager	<i>Piranga flava</i>
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>
Blue Grosbeak	<i>Guiraca caerulea</i>
Purple Finch	<i>Carpodacus purpureus</i>
Cassin's Finch	<i>Carpodacus cassinii</i>
House Finch	<i>Carpodacus mexicanus</i>
Pine Grosbeak	<i>Pinicola enucleator</i>
Pine Siskin	<i>Carduelis pinus</i>
American Goldfinch	<i>Carduelis americana</i>
Lesser Goldfinch	<i>Carduelis psaltria</i>
Red Crossbill	<i>Loxia curvirostra</i>
Green-tailed Towhee	<i>Pipilo chlorurus</i>
Rufous-sided Towhee	<i>Pipilo erythrophthalmus</i>
Brown Towhee	<i>Pipilo fuscus</i>
Lark Bunting	<i>Calamospiza melanocorys</i>
Vesper Sparrow	<i>Poocetes gramineus</i>
Lark Sparrow	<i>Chondestes grammacus</i>
Sage Sparrow	<i>Amphispiza bellii</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Gray-headed Junco	<i>Junco caniceps</i>
Chipping Sparrow	<i>Spizella passerina</i>
Brewer's Sparrow	<i>Spizella breweri</i>
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
Lincoln's Sparrow	<i>Melospiza lincolni</i>

CANADIAN GREBE H

PIL-BILBO GREBE H

CANADA GOOSE H

SNOW GOOSE H

GRANVILLE H

SHOULDER H

TURKEY H

HARLEQUIN QUAIL H

AMB-BILBO GULL H

POOR-WILL H

POCKERS CASPICUS

PODILYMBUS PODICERS

BRANTA CANADENSIS

CHEN HYPER BORCH

ANAS STAPLEA

SPATULA CLIPENTA

MELEAGRIS GALPAND MERRILL

CYNTOX MONTANUS

CANUS DELAWARENSIS

PHALANOSTILUS MULLII

(3 replicates in summer; 2 replicates in winter) for each transect (site) are shown in Tables 12, 13, and 14. Sites 2 and 12 are very similar with regard to their resident bird community; both are dominated by grassland species, primarily horned larks (*Eremophila alpestris*). Site 25, however, occurred in lava and was somewhat different in its associated vegetation and land form. There were pine trees nearby and numerous rocky outcrops, and the bird community reflects this. Site 25 was dominated by rock wrens (*Salpinctes obsoletus*) in summer and dark-eyed junco (*Junco hyemalis*) in winter; neither of which has an affinity for grasslands. The rocky outcrops and pine trees apparently dominate the habitat, even though *Xanthocephalum sarothrae* and *Bouteloua gracilis* are both present.

Since all three sites (No. 2, 12, and 25) represent *Xanthocephalum sarothrae*/*Bouteloua gracilis* - Hill habitat type, bird densities were averaged for all sites and replicates (Table 15). Assuming that site No. 25 is properly typed, and simply has rocky outcrops and pine trees interspersed throughout, it is evident that nearby habitats influence the bird community to a great degree.

Standard habitat type *Chrysothamnus nauseosus*/*Bouteloua gracilis* - Hill (code 004) was sampled for bird populations at Sites No. 13 and 29. Estimated bird densities, based on replicates, show some difference between these sites. Site No. 13 (Table 16) was in the southern portion of the Quemado Unit and Site No. 29 (Table 17) was in lava. Site No. 13 was definitely dominated by grassland species, but Site No. 29, in the lava, had juniper and pinyon trees nearby with some trees dispersed throughout the area. While horned larks were relatively abundant in summer, there were numerous mountain bluebirds (*Sialia mexicana*). Several other tree dwelling species were observed. Apparently the presence of trees, even a scattered stand, has a strong influence on the bird community of an associated shrub-grassland habitat type. Table 18 shows mean density estimates for birds throughout the habitat type, based on data from Sites No. 13 and 29. The habitat type is dominated by grassland bird species, but has relatively high densities of tree dwelling species also, as a result of the scattered pines in Site No. 29.

The *Pinus edulis*/*Juniperus monosperma*/*Bouteloua gracilis* - Hill habitat type (005/007) was sampled more often than other types because of its abundance in the study area. The sites sampled within this type

Table 12. Species list and estimated density for birds at Site No.2, standard habitat type *Xanthocephalum sarothrae/Bouteloua gracilis* - Hill, 1979.

<u>Site #2 - 002</u>		<u>E 27</u> Estimated Density (Birds/40 ha)
<u>Season</u>	<u>Species</u>	
Summer	American Kestrel	8.3
	Common Nighthawk	16.6
	Horned Lark	249.0
	Lark Sparrow	-
	Meadowlark (<i>Sturnella</i> sp.)	16.2
	Mourning Dove	16.6
	Western Meadowlark	-
Winter	American Kestrel	-
	Common Raven	-
	Ferruginous Hawk	-
	Horned Lark	54.0
	Rough-legged Hawk	-

Table 13. Species list and estimated density for birds at Site No. 12, standard habitat type, *Xanthocephalum sarothrae/Bouteloua gracilis* - Hill, 1979.

<u>Site #12 - 002</u>		<u>Estimated Density (Birds/40 ha)</u>
<u>Season</u>	<u>Species</u>	
Summer	American Kestrel	30.1
	Ash-throated Flycatcher	-
	Brown Towhee	-
	Chipping Sparrow	-
	Common Flicker	-
	Common Raven	16.6
	Horned Lark	228.3
	Meadowlark (<i>Sturnella</i> sp.)	-
	Mockingbird	-
	Pinyon Jay	-
	Rock Wren	-
Winter	Common Raven	8.3
	Horned Lark	99.6
	Mountain Bluebird	-

Table 14. Species list and estimated densities for birds at Site No. 25, standard habitat type, *Xanthocephalum sarothrae/Bouteloua gracilis* - Hill, 1979.

<u>Site #25 - 002</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	American Kestrel	-
	American Robin	-
	Ash-throated Flycatcher	-
	Bendire's Thrasher	-
	Bewick's Wren	-
	Cassin's Kingbird	-
	Chipping Sparrow	-
	Common Flicker	-
	Common Nighthawk	-
	Common Raven	-
	Flycatcher (<i>Empidonax</i> sp.)	-
	Hepatic Tanager	-
	Horned Lark	12.5
	Lewis' Woodpecker	8.3
	Mockingbird	-
	Pinyon Jay	24.9
	Plain Titmouse	-
	Rock Wren	116.2
	Ruby-crowned Kinglet	-
	Say's Phoebe	16.6
Winter	Violet-green Swallow	-
	Western Wood Pewee	8.3
	Dark-eyed Junco	145.3
	Pinyon Jay	24.9
	Rock Wren	12.5
	Townsend's Solitaire	8.3
	White-breasted Nuthatch	8.3

Table 15. Species list and estimated mean densities for birds observed in standard habitat type No. 002, *Xanthocephalum sarothrae/Bouteloua gracilis* - Hill, based on data from site numbers 2, 12, and 25.

Season	Species	No. of Sites Where Seen	Estimated Density (Birds/40 ha)
Summer	American Kestrel	3	19.2
	American Robin	1	-
	Ash-throated Flycatcher	2	-
	Bendire's Thrasher	1	-
	Bewick's Wren	1	-
	Brown Towhee	1	-
	Cassin's Kingbird	1	-
	Chipping Sparrow	2	-
	Common Flicker	2	-
	Common Nighthawk	2	-
	Common Raven	2	16.6 ¹
	Flycatcher (<i>Empidonax</i> sp.)	1	16.6 ¹
	Hepatic Tanager	1	-
	Horned Lark	3	163.3
	Lark Sparrow	2	-
	Lewis' Woodpecker	1	8.3
	Meadowlark (<i>Sturnella</i> sp.)	2	16.2 ¹
	Mockingbird	2	-
	Mourning Dove	2	13.3
	Pinyon Jay	2	24.9
	Plain Titmouse	1	-
	Rock Wren	2	116.2 ¹
	Ruby-crowned Kinglet	1	-
	Say's Phoebe	1	16.6
	Violet-green Swallow	1	-
	Western Meadowlark	1	-
	Western Wood Pewee	1	8.3
Winter	American Kestrel	1	-
	Common Raven	2	8.3 ¹
	Dark-eyed Junco	1	145.3
	Ferruginous Hawk	1	-
	Horned Lark	2	76.8
	Mountain Bluebird	1	-
	Pinyon Jay	1	24.9
	Rock Wren	1	12.5
	Rough-legged Hawk	1	-
	Townsend's Solitaire	1	8.3
	White-breasted Nuthatch	1	8.3

¹Not all sites where species were found were used to calculate density - See text for explanation.

Table 16. Species list and estimated density for birds at Site No. 13, standard habitat type, *Chrysothamnus nauseosus/Bouteloua gracilis* - Hill, 1979.

<u>Site #13 - 004</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	American Kestrel	24.9
	Common Nighthawk	8.3
	Common Raven	-
	Eastern Meadowlark	-
	Horned Lark	29.1
	Meadowlark (<i>Sturnella</i> sp.)	8.3
	Western Meadowlark	-
Winter	Common Raven	12.5
	Horned Lark	112.0

Table 17. Species list and estimated density for birds at Site No. 29, standard habitat type, *Chrysothamnus nauseosus/Bouteloua gracilis* - Hill, 1979.

<u>Site #29 - 004</u>		<u>Estimated Density (Birds/40 ha)</u>
<u>Season</u>	<u>Species</u>	
Summer	American Kestrel	-
	Brewer's Sparrow	-
	Cassin's Kingbird	-
	Chipping Sparrow	12.5
	Common Nighthawk	8.3
	Common Raven	8.3
	Horned Lark	33.2
	Lark Sparrow	-
	Mockingbird	8.3
	Mountain Bluebird	24.9
	Rock Wren	-
Winter	Common Flicker	-
	Common Raven	49.8
	Horned Lark	8.3
	Mountain Bluebird	-
	Purple Finch	6.3
	Scrub Jay	-
	Western Flycatcher	33.2

Table 18. Species list and estimated mean densities for birds observed in standard habitat type No. 004, *Chrysothamnus nauseosus*/*Bouteloua gracilis* - Hill, based on data from site numbers 13 and 29.

Season	Species	No. of Sites Where Seen	Estimated Density (Birds/40 ha)
Summer	American Kestrel	2	24.9 ¹
	Brewer's Sparrow	1	-
	Cassin's Kingbird	1	-
	Chipping Sparrow	2	12.5
	Common Nighthawk	2	8.3
	Common Raven	2	8.3 ¹
	Eastern Meadowlark	1	-
	Horned Lark	2	31.2
	Lark Sparrow	1	-
	Meadowlark (<i>Sturnella</i> sp.)	1	8.3
	Mockingbird	1	8.3
	Mountain Bluebird	1	24.9
	Rock Wren	1	-
	Western Meadowlark	1	-
Winter	Common Flicker	1	-
	Common Raven	2	31.2
	Horned Lark	2	60.2
	Mountain Bluebird	1	-
	Purple Finch	1	6.3
	Scrub Jay	1	-
	Western Bluebird	1	33.2

¹Not all sites where species were found were used to calculate density - see text for explanation.

were Sites No. 4, 8, 9, 10, 11, 15, 16, 18, 20, and 26. The number of species occurring in this habitat type in the summer ranged from 20 to 41 and averaged 26 species. This was approximately two times the number of species found on grassland habitat types (002 and 004) where the average number of summer species was 14.

Bird species typically dominating the samples from the 005/007 type were basically species found in a tree/understory and edge habitat. The absence or paucity of grassland species is notable (Tables 19-29). Species dominating the 005/007 type include plain titmouse (*Parus inornatus*), ash-throated flycatcher (*Myiarchus cinerascens*), common bushtit (*Psaltiriparus minimus*), chipping sparrow (*Spizella passerina*), nighthawks (*Chordeiles* sp.), house wren (*Troglodytes aedon*), mountain bluebird, violet-green swallow (*Tachycineta thalassina*), Mexican jay (*Aphelocoma ultramarina*), western bluebird, gray vireo (*Vireo vicinior*), dark-eyed junco, and pinyon jay (*Gymnorhinus cyanocephalus*). Horned larks and rock wrens were also present where grassland and rocky outcrops were present. Mean density values for all species occurring in this habitat type are shown in Table 29. Combining all 10 sites, 69 species were verified during the summer sample and 30 during the winter sampling period.

Habitat type 008, *Pinus edulis/Bouteloua gracilis*-Mesa, contained most of the same bird species (Table 30) as those found in type 005/007. The elevation and vegetation were comparable to 005/007 also. Habitat type 008 was represented by one transect (Site No. 17). The site was represented by 27 species in summer and 9 in winter. The summer sample was dominated by Bewick's wren (*Thryomanes bewickii*), chipping sparrow, common bushtit, mountain bluebird, and plain titmouse. Winter sample was dominated by pinyon jay and western bluebird.

Habitat type 009, *Pinus edulis/Juniperus monosperma* - Mesa, represented by only one transect (Site No. 23) contained a bird community (Table 31) very similar to other habitat types dominated by pinyon pine and/or juniper. This site was well represented with 25 species in summer and 18 species in winter.

Habitat type 011, *Bouteloua gracilis/Aristida longiseta* - Hill, is represented by one transect (Site No. 5) and its bird community reflects grassland habitat (Table 32). The transect was situated near a pinyon pine wooded area with a few trees occurring near one end. Because of the presence

Table 19. Species list and estimated density for birds at Site No. 4, standard habitat type *Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Hill, 1979.

<u>Site #4 - 005/007</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	Acorn Woodpecker	-
	American Kestrel	-
	American Robin	-
	Ash-throated Flycatcher	30.4
	Black-headed Grosbeak	8.3
	Black-throated Gray Warbler	-
	Blue Grosbeak	-
	Cassin's Kingbird	-
	Chipping Sparrow	16.6
	Common Bushtit	16.6
	Common Flicker	8.3
	Common Raven	12.5
	Flycatcher (<i>Empidonax</i> sp.)	-
	Gray Vireo	24.9
	House Finch	8.3
	Lucy's Warbler	-
	Pinyon Jay	12.5
	Plain Titmouse	45.7
	Purple Martin	8.3
	Rock Wren	16.6
	Rough-winged Swallow	8.3
	Rufous-sided Towhee	8.3
	Scrub Jay	9.7
	Violet-Green Swallow	-
	Western Bluebird	12.5
	White-breasted Nuthatch	6.3
Winter	Brown Towhee	16.6
	Chipping Sparrow	16.6
	Common Bushtit	-
	Common Raven	-
	Dark-eyed Junco	12.5
	Gray-headed Junco	8.3
	House Finch	-
	Pinyon Jay	-
	Plain Titmouse	41.5
	Ruby-crowned Kinglet	8.3
	Western Bluebird	-
	White-breasted Nuthatch	-

Table 20. Species list and estimated density for birds at Site No. 8, standard habitat type, *Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Hill, 1979.

Site #8 - 005/007		
Season	Species	Estimated Density (Birds/40 ha)
Summer	American Kestrel	-
	Ash-throated Flycatcher	42.7
	Bewick's Wren	8.3
	Cassin's Kingbird	8.3
	Chipping Sparrow	55.3
	Common Bushtit	91.3
	Common Flicker	24.9
	Common Nighthawk	24.9
	Common Raven	8.3
	Flycatcher (<i>Empidonax</i> sp.)	-
	Great Horned Owl	8.3
	Horned Lark	-
	Lark Sparrow	-
	Mexican Jay	-
	Mountain Bluebird	-
	Mountain Chickadee	30.3
	Mourning Dove	49.8
	Pinyon Jay	8.3
	Plain Titmouse	226.9
	Rufous Hummingbird	-
	Scrub Jay	-
	Violet-green Swallow	8.3
	Western Bluebird	-
	White-breasted Nuthatch	-
Winter	Common Flicker	5.0
	Common Raven	8.3
	Dark-eyed Junco	74.4
	Downy Woodpecker	-
	Mountain Bluebird	-
	Mountain Chickadee	24.9
	Plain Titmouse	16.6
	Scrub Jay	33.2
	Western Bluebird	41.5
	White-breasted Nuthatch	8.3

Table 21. Species list and estimated density for birds at Site No. 9, standard habitat type, *Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Hill, 1979.

<u>Site #9 - 005/007</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	American Kestrel	-
	American Robin	-
	Ash-throated Flycatcher	16.6
	Bewick's Wren	8.3
	Black-throated Gray Warbler	8.3
	Broad-tailed Hummingbird	16.6
	Brown Towhee	16.6
	Cassin's Kingbird	-
	Chipping Sparrow	32.5
	Common Bushtit	24.9
	Common Flicker	6.3
	Common Nighthawk	91.3
	Flycatcher (<i>Empidonax</i> sp.)	16.6
	Gray Vireo	8.3
	Great Horned Owl	-
	Green-tailed Towhee	7.3
	House Finch	15.6
	House Wren	99.6
	Mexican Jay	-
	Mockingbird	-
	Mourning Dove	16.6
	Mountain Bluebird	13.8
	Plain Titmouse	12.5
	Rock Wren	31.3
	Scrub Jay	6.3
	Violet-green Swallow	27.7
	Western Bluebird	8.3
	White-breasted Nuthatch	-
Winter	Brown Towhee	-
	Common Raven	99.6
	Dark-eyed Junco	24.9
	Hairy Woodpecker	-
	Mountain Bluebird	8.3
	Pinyon Jay	-
	Plain Titmouse	8.3
	Scrub Jay	8.3
	Townsend's Solitaire	16.6

Table 22. Species list and estimated density for birds at Site No. 10, standard habitat type, *Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Hill, 1979.

<u>Site #10 - 005/007</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	American Robin	-
	Ash-throated Flycatcher	16.6
	Broad-tailed Hummingbird	8.3
	Chipping Sparrow	120.4
	Common Flicker	12.5
	Common Nighthawk	49.8
	Common Raven	7.3
	Flycatcher (<i>Empidonax</i> sp.)	8.3
	Hairy Woodpecker	5.0
	House Wren	18.8
	Lesser Goldfinch	16.6
	Mountain Bluebird	8.3
	Mountain Chickadee	16.6
	Mourning Dove	-
	Plain Titmouse	37.5
	Purple Martin	24.9
	Scrub Jay	8.3
	Violet-Green Swallow	33.2
	Western Bluebird	12.5
	Western Wood Pewee	8.3
	White-breasted Nuthatch	20.8
Winter	Common Raven	24.9
	Dark-eyed Junco	44.6
	Gray-headed Junco	23.3
	Mexican Jay	5.0
	Mountain Bluebird	199.2
	Mountain Chickadee	16.6
	Pinyon Jay	-
	Plain Titmouse	6.3
	Scrub Jay	-
	White-breasted Nuthatch	8.3

Table 23. Species list and estimated density for birds at Site No. 11, standard habitat type, *Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Hill, 1979.

<u>Site #11 - 005-007</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	Acorn Woodpecker	-
	American Kestrel	-
	Ash-throated Flycatcher	16.6
	Bewick's Wren	24.9
	Black-capped Chickadee	24.9
	Brown Towhee	16.6
	Brown-headed Cowbird	-
	Cassin's Kingbird	-
	Chipping Sparrow	78.9
	Common Bushtit	24.9
	Common Flicker	22.9
	Common Nighthawk	348.6
	Gray Vireo	-
	Lark Sparrow	8.3
	Lesser Nighthawk	-
	MacGillivray's Warbler	8.3
	Mountain Bluebird	166.0
	Mountain Chickadee	8.3
	Mourning Dove	51.9
	Pinyon Jay	-
	Plain Titmouse	45.7
	Rock Wren	83.0
	Rufous-sided Towhee	-
	Scrub Jay	8.3
	Violet-green Swallow	-
	White-breasted Nuthatch	-
Winter	American Robin	-
	Brown Towhee	8.3
	Common Flicker	8.3
	Common Raven	8.3
	Cooper's Hawk	-
	Dark-eyed Junco	166.0
	Hairy Woodpecker	8.3
	Horned Lark	16.6
	Mountain Bluebird	-
	Pinyon Jay	-
	Plain Titmouse	29.1
	Townsend's Solitaire	8.3
	White-breasted Nuthatch	-

Table 24. Species list and estimated densities for birds at Site No. 15, standard habitat type, *Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Hill, 1979.

<u>Site #15 - 005/007</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	Ash-throated Flycatcher	-
	Bewick's Wren	-
	Blue-gray Gnatcatcher	-
	Brown Towhee	8.3
	Brown-headed Cowbird	8.3
	Cassin's Kingbird	24.9
	Chipping Sparrow	24.9
	Common Flicker	-
	Common Nighthawk	16.6
	Flycatcher (<i>Empidonax</i> sp.)	8.3
	Horned Lark	-
	Lark Bunting	8.3
	Mexican Jay	33.2
	Mountain Bluebird	33.2
	Mourning Dove	8.3
	Pinyon Jay	-
	Plain Titmouse	41.5
	Red-tailed Hawk	-
	Rock Wren	8.3
	Say's Phoebe	8.3
	Scrub Jay	6.2
	Violet-green Swallow	6.5
	Western Bluebird	24.9
	Western Meadowlark	-
	Western Wood Pewee	-
Winter	Common Raven	8.3
	Hairy Woodpecker	-
	Hummingbird (<i>Selasphorus</i> sp.)	8.3
	Mexican Jay	-
	Plain Titmouse	6.2
	Western Bluebird	16.6

Table 25. Species list and estimated densities for birds at Site No. 16, standard habitat type, *Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Hill, 1979.

<u>Site #16 - 005/007</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	Ash-throated Flycatcher	26.3
	Bewick's Wren	41.5
	Brewer's Sparrow	16.6
	Brown Towhee	8.3
	Cassin's Finch	-
	Cassin's Kingbird	-
	Chipping Sparrow	45.7
	Common Flicker	8.3
	Common Nighthawk	16.6
	Common Raven	-
	Eastern Meadowlark	-
	Lesser Nighthawk	33.2
	Lincoln's Sparrow	9.2
	Meadowlark (<i>Sturnella</i> sp.)	12.5
	Mockingbird	4.2
	Mountain Bluebird	16.6
	Mourning Dove	23.5
	Plain Titmouse	37.4
	Rock Wren	9.3
	Western Meadowlark	-
Winter	Bluebird (<i>Sialia</i> sp.)	-
	Common Bushtit	87.2
	Common Flicker	-
	Common Raven	-
	Dark-eyed Junco	20.0
	Pinyon Jay	66.4
	Plain Titmouse	8.3

Table 26. Species list and estimated densities for birds at Site No. 18, standard habitat type, *Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Hill, 1979.

<u>Site #18 - 005/007</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	Ash-throated Flycatcher	20.8
	Bell's Vireo	8.3
	Bewick's Wren	-
	Broad-tailed Hummingbird	5.0
	Cassin's Kingbird	8.1
	Chipping Sparrow	72.7
	Common Flicker	-
	Common Nighthawk	-
	Flycatcher (<i>Empidonax</i> sp.)	6.3
	Goshawk	-
	House Finch	-
	House Wren	33.2
	Mexican Jay	-
	Mountain Bluebird	16.6
	Mountain Chickadee	12.5
	Mourning Dove	16.6
	Plain Titmouse	8.3
	Rufous-sided Towhee	16.6
	Scrub Jay	-
	Solitary Vireo	6.3
	Violet-green Swallow	41.5
	Western Bluebird	41.5
	Western Tanager	16.1
Winter	American Robin	6.3
	Brown Creeper	-
	Brown Towhee	8.3
	Common Bushtit	-
	Common Flicker	8.3
	Common Raven	-
	Dark-eyed Junco	157.7
	Mountain Bluebird	-
	Horned Lark	58.1
	House Finch	-
	Pinyon Jay	-
	Plain Titmouse	10.0
	Scrub Jay	-
	Sharp-shinned Hawk	-
	Townsend's Solitaire	-
	White-breasted Nuthatch	8.3

Black-tailed
in the
back

Table 27. Species list and estimated densities for birds at Site No. 20, standard habitat type, *Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Hill, 1979.

<u>Site #20 - 005/007</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	American Kestrel	-
	American Robin	8.3
	Ash-throated Flycatcher	12.5
	Bewick's Wren	8.3
	Black-headed Grosbeak	8.3
	Black-throated Gray Warbler	16.6
	Brewer's Sparrow	-
	Brown Towhee	16.6
	Cassin's Kingbird	-
	Chipping Sparrow	195.1
	Common Flicker	17.5
	Common Nighthawk	-
	Common Raven	-
	Flycatcher (<i>Empidonax</i> sp.)	16.6
	Gray Vireo	66.4
	Green-tailed Towhee	16.6
	Hairy Woodpecker	8.3
	Hepatic Tanager	-
	House Finch	16.6
	Lesser Goldfinch	-
	Mexican Jay	12.5
	Mountain Bluebird	-
	Mountain Chickadee	8.3
	Mourning Dove	8.3
	Northern Oriole	-
	Olive-sided Flycatcher	6.3
	Pine Siskin	8.3
	Pinyon Jay	-
	Plain Titmouse	10.8
	Red-tailed Hawk	-
	Rock Wren	29.1
	Rufous Hummingbird	41.5
	Rufous-sided Towhee	14.6
	Say's Phoebe	-
	Scrub Jay	24.9
	Solitary Vireo	18.2
	Violet-green Swallow	137.0
	Western Bluebird	37.4
	Western Wood Pewee	8.3
	White-breasted Nuthatch	16.6

Table 27. (continued)

<u>Site #20 - 005/007</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Winter	Common Flicker	-
	Common Raven	-
	Dark-eyed Junco	464.8
	Mexican Jay	16.6
	Mountain Bluebird	33.2
	Mountain Chickadee	33.2
	Pinyon Jay	-
	Plain Titmouse	52.0
	Rock Wren	-
	Rufous-sided Towhee	-
	Scrub Jay	-
	Townsend's Solitaire	24.9
	Western Bluebird	66.4
	White-breasted Nuthatch	8.3

Table 28. Species list and estimated densities for birds at Site No. 26, standard habitat type, *Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Hill, 1979.

<u>Site #26 - 005/007</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	American Kestrel	8.3
	Ash-throated Flycatcher	16.6
	Bewick's Wren	16.6
	Black-throated Gray Warbler	12.5
	Chipping Sparrow	33.2
	Common Flicker	-
	Cooper's Hawk	8.3
	Dusky Flycatcher	-
	Flycatcher (<i>Empidonax</i> sp.)	11.5
	Green-tailed Towhee	6.3
	Hairy Woodpecker	5.0
	Hepatic Tanager	-
	House Finch	12.5
	Hummingbird (<i>Selasphorus</i> sp.)	25.0
	Lark Sparrow	-
	Mexican Jay	24.9
	Mountain Bluebird	8.3
	Northern Shrike	5.0
	Pinyon Jay	-
	Plain Titmouse	16.6
	Rock Wren	33.2
	Solitary Vireo	-
	Violet-green Swallow	8.3
	Western Wood Pewee	-
	White-breasted Nuthatch	8.3
Winter	American Robin	8.3
	Common Raven	8.3
	Dark-eyed Junco	37.4
	Gray-headed Junco	8.3
	Hairy Woodpecker	-
	Mountain Bluebird	70.6
	Plain Titmouse	6.3
	Purple Finch	58.1
	Scrub Jay	-
	Townsend's Solitaire	16.6
	Western Bluebird	33.2
	White-breasted Nuthatch	8.3

Table 29. Species list and estimated mean densities for birds observed in standard habitat types No. 005/007, *Pinus edulis*/*Juniperus monosperma*/*Bouteloua gracilis* - Hill, based on data from site numbers 4, 8, 9, 10, 11, 15, 16, 18, 20, and 26.

Season	Species	No. of Sites Where Seen	Estimated Density ¹ (Birds/40 ha)
Summer	Acorn Woodpecker	2	8.3
	American Kestrel	6	8.3
	American Robin	4	22.1
	Ash-throated Flycatcher	10	8.3
	Bell's Vireo	1	8.3
	Bewick's Wren	8	13.5
	Black-capped Chickadee	1	25.0
	Black-headed Grosbeak	2	8.3
	Black-throated Gray Warbler	4	12.5
	Blue Grosbeak	1	-
	Blue-gray Gnatcatcher	1	-
	Brewer's Sparrow	2	16.6
	Broad-tailed Hummingbird	3	10.0
	Brown Towhee	5	13.3
	Brown-headed Cowbird	2	8.3
	Cassin's Finch	1	-
	Cassin's Kingbird	8	13.8
	Chipping Sparrow	10	67.5
	Common Bushtit	4	39.4
	Common Flicker	10	14.4
	Common Raven	5	9.4
	Cooper's Hawk	1	8.3
	Dusky Flycatcher	1	-
	Eastern Meadowlark	1	-
	Flycatcher (<i>Empidonax</i> sp.)	8	11.3
	Goshawk	1	-
	Gray Vireo	4	33.2
	Great Horned Owl	2	8.3
	Green-tailed Towhee	3	10.1
	Hairy Woodpecker	3	6.1
	Hepatic Tanager	2	-
	Horned Lark	2	-
	House Finch	5	13.3
	House Wren	3	50.5
	Hummingbird (<i>Selasphorus</i> sp.)	1	25.0
	Lark Bunting	1	8.3
	Lark Sparrow	3	8.3
	Lesser Goldfinch	2	16.6
	Lesser Nighthawk	2	33.2
	Lincoln's Sparrow	1	9.2
	Lucy's Warbler	1	-
	MacGillivray's Warbler	1	8.3

Table 29. (continued)

Season	Species	No. of Sites Where Seen	Estimated Density ¹ (Birds/40 ha)
	Meadowlark (<i>Sturnella</i> sp.)	1	12.5
	Mexican Jay	6	23.5
	Mockingbird	9	16.2
	Mountain Bluebird	9	16.2
	Mountain Chickadee	5	15.2
	Mourning Dove	8	25.6
	Northern Oriole	1	-
	Northern Shrike	1	5.0
	Olive-sided Flycatcher	1	6.3
	Pine Siskin	1	8.3
	Pinyon Jay	6	10.4
	Plain Titmouse	9	48.6
	Purple Martin	2	16.6
	Red-tailed Hawk	2	-
	Rock Wren	7	30.1
	Rough-winged Swallow	1	8.3
	Rufous Hummingbird	2	41.5
	Rufous-sided Towhee	4	13.2
	Say's Phoebe	2	8.3
	Scrub Jay	8	10.6
	Solitary Vireo	10	12.3
	Violet-green Swallow	9	37.5
	Western Bluebird	8	20.8
	Western Meadowlark	2	-
	Western Tanager	1	16.1
	Western Wood Pewee	4	8.3
	White-breasted Nuthatch	7	13.0
Winter	American Robin	3	7.3
	Bluebird (<i>Sialia</i> sp.)	1	-
	Brown Creeper	1	-
	Brown Towhee	4	11.1
	Chipping Sparrow	1	16.6
	Common Bushtit	3	87.2
	Common Flicker	5	7.2
	Common Raven	10	29.9
	Cooper's Hawk	1	-
	Dark-eyed Junco	9	111.4
	Downy Woodpecker	1	-
	Gray-headed Junco	9	13.3

Table 29. (continued)

Season	Species	No. of Sites Where Seen	Estimated Density ¹ (Birds/40 ha)
	Hairy Woodpecker	4	8.3
	Horned Lark	2	37.4
	House Finch	2	-
	Hummingbird (<i>Selasphorus</i> sp.)	1	8.3
	Mexican Jay	2	5.0
	Mountain Bluebird	7	77.8
	Mountain Chickadee	3	24.9
	Pinyon Jay	7	66.4
	Plain Titmouse	10	18.5
	Purple Finch	1	58.1
	Rock Wren	1	-
	Ruby-crowned Kinglet	1	8.3
	Rufous-sided Towhee	1	-
	Scrub Jay	6	20.8
	Sharp-shinned Hawk	1	-
	Townsend's Solitaire	5	20.8
	Western Bluebird	5	33.2
	White-breasted Nuthatch	7	8.3

¹Except for the Chipping Sparrow in summer, and the Plain Titmouse in winter, not all sites where a species was found were used to calculate density. See text for explanation.

Table 30. Species list and estimated densities for birds at Site No. 17, standard habitat type, *Pinus edulis/Bouteloua gracilis* - Mesa, 1979.

<u>Site #17 - 008</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	Acorn Woodpecker	-
	Ash-throated Flycatcher	12.5
	Bewick's Wren	70.6
	Blue-gray Gnatcatcher	-
	Brown-headed Cowbird	-
	Cassin's Kingbird	-
	Chipping Sparrow	28.8
	Common Bushtit	207.5
	Common Flicker	-
	Common Raven	-
	Eastern Meadowlark	-
	Flycatcher (<i>Empidonax</i> sp.)	19.4
	Hairy Woodpecker	-
	House Finch	-
	Mountain Bluebird	42.1
	Mountain Chickadee	8.3
	Mourning Dove	8.3
	Olive-sided Flycatcher	16.6
	Pinyon Jay	-
	Plain Titmouse	58.1
	Rock Wren	16.6
	Rufous-sided Towhee	-
	Scrub Jay	-
	Violet-green Swallow	8.3
	Western Bluebird	12.5
	White-breasted Nuthatch	9.4
Winter	Common Raven	-
	Dark-eyed Junco	12.5
	Mountain Bluebird	8.3
	Mountain Chickadee	6.3
	Pinyon Jay	137.0
	Plain Titmouse	20.8
	Townsend's Solitaire	6.3
	Western Bluebird	37.4
	White-breasted Nuthatch	12.5

Table 31. Species list and estimated densities for birds at Site No. 23, standard habitat type, *Pinus edulis/Juniperus monosperma*-Mesa, 1979.

Site #23 - 009		
Season	Species	Estimated Density (Birds/40 ha)
Summer	American Kestrel	8.3
	Ash-throated Flycatcher	49.8
	Bewick's Wren	8.3
	Black-throated Gray Warbler	24.9
	Broad-tailed Hummingbird	-
	Brown Towhee	66.4
	Cassin's Finch	8.3
	Cassin's Kingbird	-
	Chipping Sparrow	66.4
	Common Flicker	-
	Flycatcher (<i>Empidonax</i> sp.)	6.3
	Lark Sparrow	16.6
	Lesser Goldfinch	8.3
	Mexican Jay	-
	Mockingbird	-
	Mountain Bluebird	11.4
	Mourning Dove	33.2
	Pinyon Jay	16.6
	Plain Titmouse	-
	Red-breasted Nuthatch	11.1
	Rock Wren	58.1
	Rufous-sided Towhee	-
	Solitary Vireo	16.6
	Violet-green Swallow	12.5
	Western Wood Pewee	-
Winter	American Robin	16.6
	Cassin's Finch	16.6
	Common Bushtit	58.1
	Common Flicker	8.3
	Common Raven	-
	Dark-eyed Junco	141.1
	Gray-headed Junco	8.3
	Mexican Jay	-
	Mountain Bluebird	16.6
	Pinyon Jay	-
	Plain Titmouse	49.8
	Purple Finch	-
	Ruby-crowned Kinglet	8.3
	Rufous-sided Towhee	8.3
	Scrub Jay	-
	Townsend's Solitaire	31.2
	Western Bluebird	83.0
	White-breasted Nuthatch	8.3

Table 32. Species list and estimated density for birds at Site No. 5, standard habitat type, *Bouteloua gracilis*/*Aristida longiseta* - Hill, 1979.

<u>Site #5 - 011</u>		<u>Estimated Density (Birds/40 ha)</u>
<u>Season</u>	<u>Species</u>	
Summer	American Kestrel	12.5
	Cassin's Kingbird	8.3
	Common Flicker	-
	Common Nighthawk	-
	Common Raven	8.3
	Gray Vireo	-
	Horned Lark	52.6
	Mockingbird	-
	Mountain Bluebird	41.5
	Mourning Dove	-
	Pinyon Jay	-
	Plain Titmouse	-
	Western Meadowlark	8.3
Winter	Common Bushtit	-
	Dark-eyed Junco	-
	Horned Lark	419.2

of trees, numerous mountain bluebirds were present in the summer. All other species of any consequence were those having an affinity for grasslands (American kestrel, *Falco sparverius*; meadowlark, *Sturnella* sp.; and horned larks).

Habitat type 014, *Salsola kali*/*Sporobolus airoides* - Valley, represented by Site No. 14, reflects degraded grassland habitat (Table 33). Horned larks were the dominant species in summer and winter. A golden eagle (*Aquila chrysaetos*) was recorded at this site, but was apparently attracted there by a cow carcass on the transect. Some tree-dwelling bird species were recorded occasionally, due to scattered trees near the transect.

Habitat type 016, *Atriplex canescens*/*Bouteloua gracilis* - Lacustrine Plain, sampled along one transect (Site No. 1), was represented by a bird community normally found in grassland and desert shrub (Table 34). Horned lark dominated the summer and winter samples, which was a reflection of the open grassland in this area, while the presence of Brewer's sparrow and lark sparrow were a reflection of the shrub components of the habitat type.

Habitat type 018, *Pinus ponderosa*/*Bouteloua gracilis* - Endogenic Rock, was sampled along one transect (Site No. 24 Table 35). Red crossbill (*Loxia curvirostra*), typical of pine forests, occurred in this habitat type. It was one of about 10 common nesting species in summer and was also the dominant bird in the winter samples. Other species with an affinity for conifers were common. Chipping sparrow dominated summer samples with red crossbill and junco dominating the winter samples.

Habitat type 019/020, *Pinus edulis*/*Juniperus monosperma*/*Bouteloua gracilis* - Endogenic Rock, represented by one transect (Site No. 28) was inhabited by a diverse group of mostly shrub and tree-dwelling birds (Table 36). This diversity was similar to the diversity typical of all pinyon-juniper sites, even though this site was located on lava. Pinyon jays and rock wrens were the dominant birds in summer; pinyon jays, red crossbills, mountain bluebirds, and juncos were dominant in winter.

Habitat type 021, *Juniperus monosperma*/*Pinus edulis* - Endogenic Rock, was represented by one transect (Site No. 27). Diversity was comparable to that found in pinyon-juniper habitats (Types 005/007, 009, 019/020). Mountain bluebirds, rock wrens, and violet-green swallows were dominant in summer. In winter, dark-eyed juncos were dominant (Table 37).

Table 33. Species list and estimated densities for birds in Site No. 14, standard habitat type, *Salsola kali*/*Sporobolus airoides* - Valley, 1979.

<u>Site #14 - 014</u>		<u>Estimated Density (Birds/40 ha)</u>
<u>Season</u>	<u>Species</u>	
Summer	American Kestrel	-
	Ash-throated Flycatcher	-
	Brewer's Sparrow	8.3
	Brown Towhee	-
	Chipping Sparrow	-
	Eastern Meadowlark	-
	Horned Lark	83.0
	Loggerhead Shrike	-
	Meadowlark (<i>Sturnella</i> sp.)	-
	Mockingbird	-
	Say's Phoebe	8.3
	Western Meadowlark	6.3
Winter	American Kestrel	-
	Common Raven	8.3
	Golden Eagle	-
	Horned Lark	33.2

Table 34. Species list and estimated densities for birds at Site No. 1, standard habitat type *Atriplex canescens/Bouteloua gracilis* - Lacustrine Plain, 1979.

<u>Site #1 - 016</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	Bendire's Thrasher	-
	Brewer's Sparrow	124.5
	Common Raven	8.3
	Golden Eagle	-
	Horned Lark	188.1
	Hummingbird (<i>Selasphorus</i> sp.)	6.3
	Lark Sparrow	16.6
	Meadowlark (<i>Sturnella</i> sp.)	15.7
	Prairie Falcon	-
	Swainson's Hawk	-
	Vesper Sparrow	18.8
	Western Meadowlark	-
Winter	Horned Lark	124.5
	Rough-legged Hawk	-
	Scaled Quail	-

Table 35. Species list and estimated densities for birds at Site No. 24, standard habitat type, *Pinus ponderosa/Bouteloua gracilis* - Endogenic Rock, 1979.

<u>Site #24 - 018</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	American Robin	6.3
	Broad-tailed Hummingbird	-
	Chipping Sparrow	41.5
	Common Flicker	-
	Common Nighthawk	12.5
	Flycatcher (<i>Empidonax</i> sp.)	16.6
	Gray Flycatcher	6.3
	House Finch	16.6
	Pinyon Jay	16.6
	Red Crossbill	16.6
	Rock Wren	33.2
	Violet-green Swallow	24.9
	Western Wood Pewee	16.6
Winter	White-breasted Nuthatch	-
	Brown Towhee	12.5
	Common Flicker	16.6
	Dark-eyed Junco	49.8
	Gray-headed Junco	66.4
	Red Crossbill	145.4
	Rock Wren	12.5
	Townsend's Solitaire	8.3
	White-breasted Nuthatch	8.3

Table 36. Species list and estimated densities for birds at Site No. 28, standard habitat type, *Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Endogenic Rock, 1979.

Site #28 - 019/020		
Season	Species	Estimated Density (Birds/40 ha)
Summer	American Robin	8.3
	Ash-throated Flycatcher	-
	Black-headed Grosbeak	-
	Brewer's Sparrow	-
	Cassin's Kingbird	12.5
	Chipping Sparrow	9.4
	Common Flicker	-
	Flycatcher (<i>Empidonax</i> sp.)	-
	Evening Grosbeak	12.5
	Hepatic Tanager	16.6
	House Finch	-
	Lark Sparrow	-
	Mexican Jay	-
	Mountain Chickadee	16.6
	Mourning Dove	-
	Olive-sided Flycatcher	-
	Pine Grosbeak	16.6
	Pinyon Jay	120.4
	Plain Titmouse	-
	Red Crossbill	16.6
	Red-tailed Hawk	-
	Rock Wren	49.8
	Say's Phoebe	8.3
	Solitary Vireo	12.5
	Western Wood Pewee	10.0
	White-breasted Nuthatch	-
Winter	American Robin	-
	Cassin's Finch	6.3
	Common Flicker	8.3
	Common Raven	16.6
	Dark-eyed Junco	58.1
	Gray-headed Junco	99.6
	Hairy Woodpecker	5.0
	Mountain Bluebird	165.9
	Pinyon Jay	506.3
	Purple Finch	74.7
	Red Crossbill	307.1
	Red-breasted Nuthatch	24.9
	Townsend's Solitaire	8.3
	Western Bluebird	74.7
	White-breasted Nuthatch	-

Table 37. Species list and estimated densities for birds at Site No. 27, standard habitat type, *Juniperus monosperma*/*Pinus edulis* - Endogenic Rock, 1979.

<u>Site #27 - 021</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	Ash-throated Flycatcher	16.6
	Broad-tailed Hummingbird	8.3
	Cassin's Kingbird	8.3
	Chipping Sparrow	8.3
	Common Bushtit	16.6
	Common Nighthawk	16.6
	Flycatcher (<i>Empidonax</i> sp.)	8.3
	Hairy Woodpecker	6.3
	Hepatic Tanager	33.2
	Mountain Bluebird	41.5
	Mountain Chickadee	-
	Mourning Dove	24.9
	Pinyon Jay	-
	Plain Titmouse	6.3
	Red Crossbill	-
	Rock Wren	41.5
	Say's Phoebe	8.3
	Violet-green Swallow	41.5
	White-crowned Sparrow	24.9
Winter	American Robin	-
	Brown Towhee	8.3
	Dark-eyed Junco	132.8
	Red-tailed Hawk	-
	Rock Wren	6.3
	Scrub Jay	-
	Townsend's Solitaire	6.7
	White-breasted Nuthatch	-

Habitat type 022, *Xanthocephalum sarothrae/Bouteloua gracilis* - Valley, represented by one transect (Site No. 19), was not noticeably different from Site No. 2 (*Xanthocephalum sarothrae/Bouteloua gracilis* - Hill) in terms of vegetation or bird species observed. Horned larks were the dominant species, both in summer and winter (Table 38).

Habitat type 026, *Pinus edulis/Fallugia paradoxa* - Intermittent Stream Riparian, was represented by one transect (Site No. 3). It was the most diverse site in summer, with 50 breeding bird species occurring there (Table 39). Due to the variety of physical features (low cliffs, bluffs, boulders, sandy wash areas) and vegetation (ponderosa pine, *Pinus ponderosa*; Gambel oak, *Quercus gambelii*; and rabbitbrush, *Chrysothamnus nauseosus*) as well as pinyon pine and apache plume (*Fallugia paradoxa*), the birds encountered represented a variety of groups. Pinyon jays and common bushtits dominated the type in summer. Diversity of this type in winter was comparable to the areas of pinyon-juniper habitat. Species represented were also comparable with dark-eyed juncos being the dominant species.

Habitat type 031, *Juniperus monosperma/Fallugia paradoxa* - Endogenic Rock, was represented by one transect (Site No. 22). Despite the occurrence of large areas of bare recent lava, a fairly diverse bird community was found there in the summer (Table 40). Rock wrens were common, due to the presence of lava in the area. Violet-green swallows and chipping sparrows were co-dominant with the rock wrens. The presence of much apache plume doubtless contributed to the desirability of the area for breeding birds. In the winter, with the breeding birds gone, only a few species occurred in this type. Pinyon jays were the most abundant species in winter.

Habitat type 032, *Atriplex canescens/Bouteloua gracilis* - Valley, was represented by transect No. 21 (Table 41). A comparison can be made between this type and the *Atriplex canescens/Bouteloua gracilis* - Lacustrine Plain type (016) (Site No. 1) (Table 34). In both habitat types, horned larks were dominant in summer and either dominant or common in winter. Both types were also characterized by meadowlarks and Brewer's sparrows (*Spizella breweri*). More species were present in habitat type 032 than in type 016, however, probably because of the scattered pinyon-juniper that occurred on one end of the site. Pinyon-juniper habitat was also situated nearby in two

Table 38. Species list and estimated densities for birds at Site No. 19, standard habitat type, *Xanthocephalum sarothrae/Bouteloua gracilis* - Valley, 1979.

<u>Site #19 - 022</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer		
	American Kestrel	-
	Broad-tailed Hummingbird	-
	Common Nighthawk	-
	Common Raven	-
	Horned Lark	522.9
	Killdeer	-
	Mourning Dove	-
	Rufous Hummingbird	8.3
	Violet-green Swallow	-
Winter		
	Common Raven	8.3
	Horned Lark	68.5

Table 39. Species list and estimated density for birds at Site No. 3, standard habitat type *Pinus edulis/Fallugia paradoxa* - Intermittent Stream Riparian, 1979.

		Site #3 - 026	Estimated Density (Birds/40 ha)
Season	Species		
Summer	Acorn Woodpecker		8.3
	American Kestrel		-
	American Robin		24.9
	Ash-throated Flycatcher		16.6
	Bendire's Thrasher		-
	Bewick's Wren		8.3
	Black-chinned Hummingbird		16.6
	Black-throated Gray Warbler		-
	Brown Towhee		33.2
	Brown-headed Cowbird		-
	Cassin's Finch		-
	Cassin's Kingbird		19.4
	Chipping Sparrow		33.2
	Common Bushtit		290.5
	Common Flicker		10.4
	Common Nighthawk		8.3
	Curve-billed Thrasher		8.3
	Flycatcher (<i>Empidonax</i> sp.)		33.2
	Flycatcher (<i>Myiarchus</i> sp.)		-
	Gray Vireo		-
	Gray-headed Junco		16.6
	Great Horned Owl		-
	Green-tailed Towhee		-
	Hairy Woodpecker		-
	Hepatic Tanager		16.6
	House Wren		8.3
	Hummingbird (<i>Archilochus</i> sp.)		24.9
	Lewis' Woodpecker		-
	MacGillivray's Warbler		-
	Mountain Bluebird		-
	Mourning Dove		37.4
	Orange-crowned Warbler		-
	Ovenbird		24.9
	Pine Siskin		25.0
	Pinyon Jay		788.5
	Plain Titmouse		15.3
	Red-breasted Nuthatch		-
	Red-tailed Hawk		8.3
	Rock Wren		69.8
	Rose-breasted Grosbeak		-
	Rufous-sided Towhee		16.6

Table 39. (continued)

		<u>Site #3 - 026</u>	
<u>Season</u>	<u>Species</u>		<u>Estimated Density</u> <u>(Birds/40 ha)</u>
	Scrub Jay		12.6
	Solitary Vireo		-
	Swainson's Thrush		-
	Violet-green Swallow		-
	Western Bluebird		33.2
	Western Tanager		16.6
	Western Wood Pewee		10.0
	White-breasted Nuthatch		24.9
	Yellow-rumped Warbler		-
Winter	Chipping Sparrow		16.6
	Dark-eyed Junco		91.3
	Gray-headed Junco		-
	Great Horned Owl		-
	Mountain Bluebird		-
	Pinyon Jay		-
	Plain Titmouse		25.0
	Red-tailed Hawk		-
	Rock Wren		-
	Ruby-crowned Kinglet		24.9
	Western Bluebird		8.3
	White-breasted Nuthatch		8.3

Table 40. Species list and estimated densities for birds at Site No. 22, standard habitat type, *Juniperus monosperma*/*Fallugia paradoxa* - Endogenic Rock, 1979.

<u>Site #22 - 031</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	Ash-throated Flycatcher	12.5
	Bewick's Wren	24.9
	Broad-tailed Hummingbird	-
	Brown Towhee	-
	Canyon Wren	-
	Cassin's Kingbird	-
	Chipping Sparrow	33.2
	Flycatcher (<i>Empidonax</i> sp.)	-
	Hairy Woodpecker	-
	Hepatic Tanager	-
	Hermit Thrush	-
	House Finch	33.2
	Mourning Dove	8.3
	Ovenbird	-
	Pinyon Jay	-
	Plain Titmouse	8.3
	Prairie Falcon	8.3
	Rock Wren	49.8
	Sharp-shinned Hawk	8.3
	Townsend's Warbler	-
	Violet-green Swallow	49.8
	Western Bluebird	16.6
	Western Wood Pewee	4.2
	White-breasted Nuthatch	-
Winter	Common Raven	16.6
	Dark-eyed Junco	-
	Mountain Bluebird	-
	Pinyon Jay	498.0
	Western Bluebird	-

Table 41. Species list and estimated densities for birds at Site No. 21, standard habitat type, *Atriplex canescens/Bouteloua gracilis* - Valley, 1979.

<u>Site #21 - 032</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	American Kestrel	-
	Bendire's Thrasher	-
	Bewick's Wren	-
	Brewer's Sparrow	33.2
	Cassin's Kingbird	8.3
	Chipping Sparrow	-
	Common Raven	16.6
	Eastern Meadowlark	12.5
	Green-tailed Towhee	8.3
	Horned Lark	221.0
	Lark Sparrow	33.2
	Meadowlark (<i>Sturnella</i> sp.)	-
	Mockingbird	8.3
	Pinyon Jay	22.1
	Rock Wren	-
	Say's Phoebe	-
	Vesper Sparrow	-
	Violet-green Swallow	16.6
	Western Meadowlark	74.7
Winter	Common Raven	83.0
	Horned Lark	58.1
	Mountain Bluebird	49.8
	Starling	33.2

other locations, allowing the species that were more characteristic of the pinyon-juniper habitats (e.g., pinyon jay, violet-green swallows, mountain bluebirds) to expand into habitat type 032.

Habitat type 034, *Pinus ponderosa*/*Pinus edulis* - Mountain, represented by one transect (Site No. 6) was a highly diverse type (Table 42). The presence of Cottonwood Canyon in the vicinity of the transect influenced bird occurrence, making this site comparable to an intermittent stream riparian type. Forty-two bird species were recorded here in the summer, making this site the second in terms of species represented in one habitat type. The site with the most bird species represented was classified as an Intermittent Stream Riparian habitat type (026), *Pinus edulis*/*Fallugia paradoxa*, (Site No. 3). A variety of physical features and vegetation types existed in both, which was probably the reason for the high diversity of bird species found there. Green Lake was located in the vicinity of the habitat type (034). This was the only permanent water body found nearby and may have also been a contributing factor to the high diversity of species at this site. The dominant birds during the summer were: canyon wren (*Catherpes mexicanus*), Steller's jay (*Cyanocitta stelleri*), and mountain chickadee (*Parus gambelii*). Pinyon jay, common bushtit, and white-breasted nuthatch (*Sitta carolinensis*) were dominant during the winter.

Habitat type 036, *Chrysothamnus nauseosus*/*Fallugia paradoxa* - Intermittent Stream Riparian, was represented by one transect (Site No. 7). While not as diverse as the other type that was classified as intermittent stream riparian (026), this type was occupied by numerous species of birds (Table 43). Brewer's sparrow, mountain bluebird, horned lark and green-tailed towhee (*Pipilo chlorurus*) were the most common species represented during the summer count. Bendire's thrashers (*Toxostoma bendirei*) were also common, even though a density could not be calculated. During the winter count, horned larks were the most numerous, followed by white-crowned sparrows (*Zonotrichia leucophrys*), and dark-eyed juncos. Neither of these latter species were present during the summer species count.

A note on the BLM classification of this habitat type (036): little or no apache plume occurred in the area and the "intermittent stream" was a sand gully resulting from erosion. On the basis of these two facts, the area probably should be typed *Chrysothamnus nauseosus*/? - Gully.

Table 42. Species list and estimated density for birds at Site No. 6, standard habitat type, *Pinus ponderosa*/*Pinus edulis*- Mountain, 1979.

<u>Site #6 - 034</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	Acorn Woodpecker	12.5
	American Kestrel	-
	American Robin	16.6
	Ash-throated Flycatcher	24.9
	Band-tailed Pigeon	-
	Bewick's Wren	24.9
	Broad-tailed Hummingbird	-
	Brown-headed Cowbird	18.8
	Canyon Wren	62.3
	Cassin's Kingbird	6.3
	Chipping Sparrow	16.6
	Common Flicker	15.6
	Common Nighthawk	8.3
	Flammulated Owl	-
	Flycatcher (<i>Empidonax</i> sp.)	27.6
	Grace's Warbler	-
	Gray-headed Junco	33.2
	Hammond's Flycatcher	-
	Hepatic Tanager	-
	Lesser Goldfinch	-
	Mexican Jay	8.3
	Mountain Bluebird	16.6
	Mountain Chickadee	45.7
	Mourning Dove	8.3
	Olive-sided Flycatcher	-
	Pygmy Nuthatch	58.1
	Plain Titmouse	-
	Purple Martin	37.4
	Red-breasted Nuthatch	-
	Red-tailed Hawk	8.3
	Rock Wren	27.7
	Ruby-crowned Kinglet	8.3
	Rufous-sided Towhee	22.9
	Scrub Jay	-
	Solitary Vireo	41.5
	Steller's Jay	49.8
	Violet-green Swallow	-
	Western Bluebird	-
	Western Wood Pewee	22.0
	White-breasted Nuthatch	8.3

Table 42. (continued)

<u>Site #6 - 034</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
	Williamson's Sapsucker	16.6
	Willow Flycatcher	8.3
Winter	American Robin	33.2
	Bald Eagle	-
	Common Bushtit	83.0
	Common Flicker	-
	Cooper's Hawk	-
	Gray-headed Junco	24.9
	Hairy Woodpecker	-
	Mountain Chickadee	-
	Pinyon Jay	244.9
	Plain Titmouse	33.2
	Red-tailed Hawk	-
	Rock Wren	-
	Steller's Jay	-
	White-breasted Nuthatch	58.1

Table 43. Species list and estimated density for birds at Site No. 7, standard habitat type, *Chrysothamnus nauseosus*/*Fallugia paradoxa* - Intermittent Stream Riparian, 1979.

<u>Site #7 - 036</u>		
<u>Season</u>	<u>Species</u>	<u>Estimated Density (Birds/40 ha)</u>
Summer	American Kestrel	-
	Bendire's Thrasher	-
	Brewer's Sparrow	203.4
	Brown Towhee	24.9
	Cassin's Kingbird	-
	Chipping Sparrow	16.6
	Common Raven	-
	Green-tailed Towhee	49.8
	Horned Lark	49.8
	Hummingbird (<i>Selasphorus</i> sp.)	-
	Mountain Bluebird	124.0
	Pinyon Jay	24.9
	Rock Wren	25.1
	Rough-winged Swallow	16.6
	Rufous-sided Towhee	-
	Violet-green Swallow	33.2
Winter	Brewer's Sparrow	8.3
	Brown Towhee	31.3
	Dark-eyed Junco	45.7
	Gray-headed Junco	33.2
	Horned Lark	182.6
	Merlin	-
	Red-tailed Hawk	-
	Sage Sparrow	16.6
	White-crowned Sparrow	83.0

Bird Species Diversity by Habitat Type

Diversity indices were calculated for each transect, by season. The Shannon-Weaver index (H') was selected as the best overall index of diversity because it is reasonably independent of sample size and is normally distributed (Bowman et al. 1970). Emlen data were tabulated by species and number of individuals and the index was estimated following Pielou (1966a):

$$H' \text{ (species diversity)} = -\sum \frac{n_i}{n} \log_e \frac{n_i}{n}$$

where n_i is the number of individuals in the i^{th} species and n is the total number of individuals in the sample.

One advantage of the Shannon-Weaver index is that it is possible to compare H' to its upper theoretical maximum. This measure is related to redundancy and can be used to measure dominance or how evenly numbers are allocated in species categories by comparison with the calculated maximum. The evenness index of Pielou (1966b) was calculated:

$$J \text{ (evenness)} = \frac{H'}{H_{\max}} = \frac{H'}{\log_e S}$$

in which $\log_e S$ is the maximum possible value of H' .

Following Dahlberg and Odum (1970) the species richness aspect of diversity was calculated for each sample:

$$D \text{ (species richness)} = \frac{S-1}{\log_e N}$$

where S is the number of species and N is the number of individuals. This index is influenced by sample size.

Bird Diversity Values

Diversity, richness, and evenness values (Pielou 1966a, 1966b; Dahlberg and Odum 1970; MacArthur 1964) were calculated for all habitat sites for both the summer (Table 44) and winter (Table 45) seasons.

In comparing bird species diversity between transects (habitat sites) it becomes evident that certain transects were very similar (Tables 44-45). Diversity index values ranged from 0.44 to 3.27 for summer breeding birds. Ranking each transect site into general groups by diversity

Table 44. Summer bird species diversity, richness, and evenness indices by habitat type and site number, BLM, Socorro District, New Mexico, 1979.

Habitat Type Code	Site No.	No. of Species	Diversity (H)	Richness (D)	Evenness (J)
002	2	7	0.47	1.07	0.24
002	12	12	1.46	2.17	0.59
002	25	21	2.02	4.07	0.66
004	13	7	0.97	1.48	0.50
004	29	11	2.00	2.45	0.84
005/007	4	26	2.66	5.05	0.82
005/007	8	24	2.23	4.11	0.70
005/007	9	27	2.89	4.94	0.88
005/007	10	21	2.28	3.88	0.75
005/007	11	28	2.54	4.46	0.76
005/007	15	25	2.67	4.63	0.83
005/007	16	20	2.66	3.61	0.89
005/007	18	23	2.67	4.55	0.85
005/007	20	39	3.10	6.45	0.85
005/007	26	22	2.68	4.43	0.87
008	17	26	2.67	4.54	0.82
008	23	25	2.59	4.53	0.81
011	5	14	2.16	2.78	0.82
014	14	12	1.63	2.21	0.66
016	1	11	1.37	1.71	0.57
018	24	14	2.44	3.11	0.93
019/020	28	26	2.57	4.78	0.79
021	27	18	2.45	3.76	0.85
022	19	9	0.66	1.82	0.30
026	3	43	2.84	6.75	0.76
031	22	22	2.47	4.34	0.80
032	21	18	1.94	2.93	0.67
034	6	41	3.27	6.48	0.88
036	7	15	2.13	2.50	0.79
*	31	28	2.76	4.84	0.83
*	32	23	2.90	4.09	0.93
*	33	20	2.45	3.37	0.82
*	34	5	0.44	0.80	0.27
*	35	16	2.51	2.91	0.91
Range =		5-43	0.44-3.27	0.80-6.75	0.24-0.93

*BLM Transect, type unknown.

Table 45. Winter bird species diversity, richness, and evenness indices by habitat type and site number, BLM, Socorro District, New Mexico, 1979.

Habitat Type Code	Site No.	No. of Species	Diversity (H)	Richness (D)	Evenness (J)
002	2	5	0.50	1.12	0.31
002	12	3	0.34	0.56	0.31
002	25	6	1.03	1.29	0.58
004	13	2	0.43	0.29	0.63
004	29	7	1.36	1.64	0.70
005/007	4	12	2.29	2.78	0.92
005/007	8	11	2.16	2.38	0.90
005/007	9	9	1.97	1.92	0.87
005/007	10	10	1.71	1.92	0.74
005/007	11	13	1.67	2.44	0.65
005/007	15	5	1.49	1.41	0.92
005/007	16	7	1.59	1.47	0.82
005/007	18	16	2.01	2.97	0.73
005/007	20	14	1.58	2.10	0.60
005/007	26	12	2.02	2.41	0.81
008	17	9	1.49	1.93	0.68
009	23	18	1.64	2.92	0.57
011	5	3	0.25	0.41	0.22
014	14	4	0.80	0.84	0.58
016	1	3	0.43	0.46	0.40
018	24	8	1.48	1.49	0.71
019/020	28	15	1.62	2.44	0.60
021	27	9	1.21	1.57	0.55
022	19	2	0.12	0.23	0.17
026	3	19	2.29	3.49	0.78
031	22	5	0.60	0.91	0.37
032	21	4	1.19	0.67	0.86
034	6	14	1.73	2.63	0.65
036	7	9	1.55	1.77	0.71
Range =		2-19	0.12-2.29	0.23-3.49	0.17-0.92

index in summer (0.44-1.38 = low; 1.38-2.32 = medium; 2.32-3.27 = high) showed that only 5 transects ranked low, 9 ranked medium, and 20 ranked high (winter data have a similar trend). Four of 5 sites with a low species diversity ranking were all grasslands and shrub-grasslands (BLM Codes 002, 004, 016, 022). The other type was surveyed by BLM personnel and its classification was not available for this report. Habitat sites with a medium ranking for bird species diversity included grasslands, grassland mixed with shrubs, and two pinyon-juniper sites. BLM Codes for habitat sites having a medium bird species diversity ranking included: 002, 004, 005/007, 011, 014, 032, and 036.

The majority of the sites (19) were ranked as having a high species diversity. A general evaluation of the vegetation and land forms associated with these sites showed that most pinyon-juniper, all ponderosa pine, and shrub types with rocky and broken substrates fell within the high bird species diversity ranking. While these rankings are not as detailed as necessary for BLM habitat evaluations, they show that a strong correlation exists between bird species diversity and habitat diversity.

Grouping bird species diversities by habitats showed a high degree of similarity within pinyon-juniper-grama habitats 005/007 (Tables 44-45). Site No. 20, with 39 summer species, showed diversity values that were inconsistent (higher) with the other 005/007 sites, but this inconsistency may be explained by the presence of a draw near the transect which attracted various species not typical of pinyon-juniper habitats.

One site (No. 25) in broom snakeweed-grama type (Code 002) was also higher in diversity than were the other sites in this type (Sites No. 2 and 12). This site had a scattered interspersed of evergreen trees which attracted numerous tree-dwelling species.

Site No. 29 (Type 004) also had trees within the site and nearby which definitely influenced the number of bird species, as compared to Site No. 13 (004).

In order to compare species diversity between standard habitat types, those sites having more than one transect were averaged and values of bird species diversity, richness and evenness graphically depicted for comparison (Fig. 3).

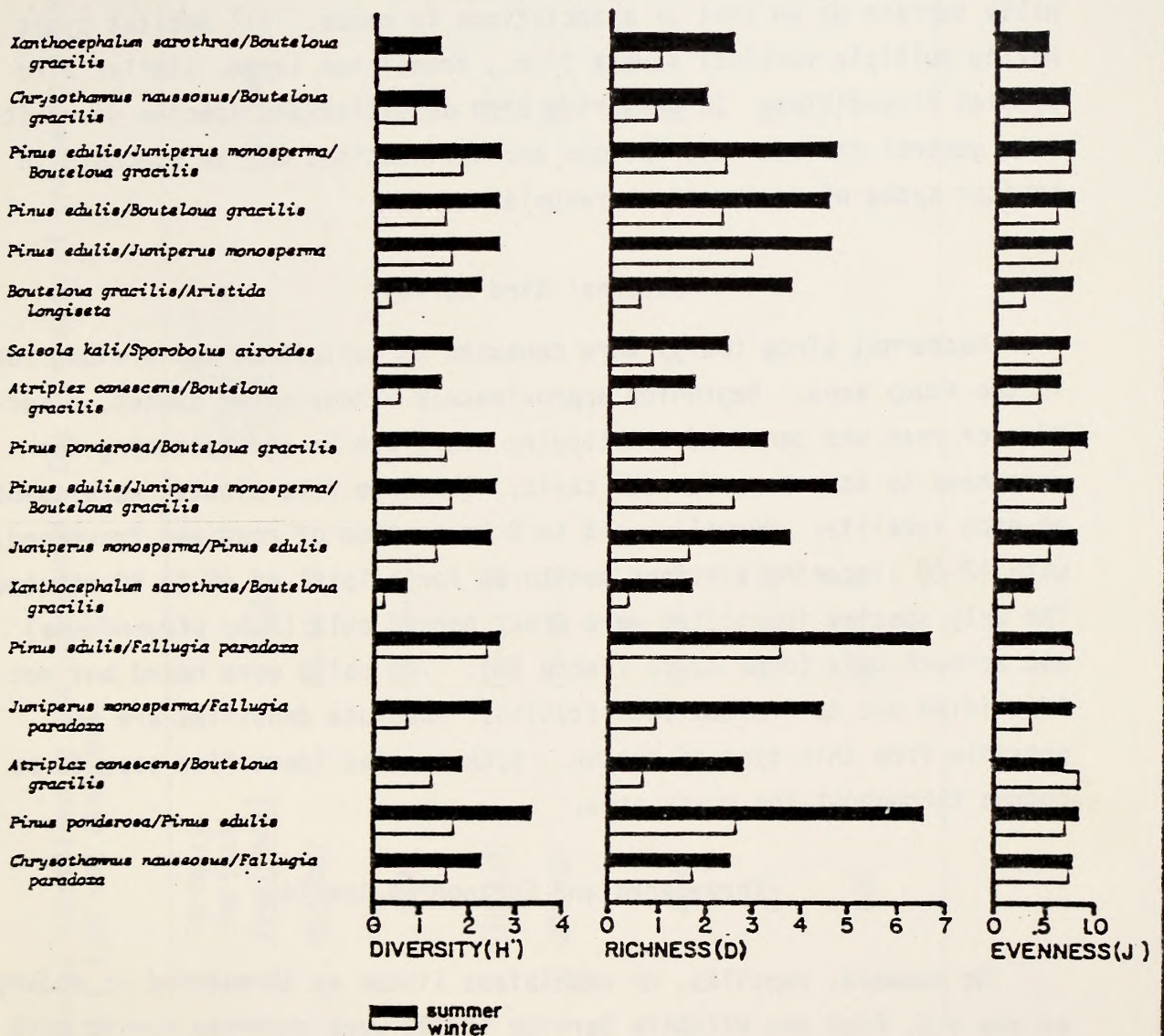


Fig. 3. Bird diversity indices by season for habitat types in the BLM Socorro District, New Mexico 1979. The first 3 habitat types show results averaged from 3, 2, and 10 transect locations, respectively.

There is evidence that bird communities are very similar (in numbers of species and individuals) in certain different habitat types as they are currently delineated. This suggests that the BLM classification system may be artificial and too finely subdivided to reflect differences in bird occurrence and diversity. There were virtually no detectable differences in bird communities found on pinyon-juniper associations in hilly terrain or on similar associations in mesas. All habitat types having multiple vertical strata (i.e., trees) had large, similar bird species diversities. In measuring bird densities and species diversities, more general habitat descriptions and delineations may be adequate in habitat types of southwestern rangelands.

Nocturnal Bird Survey

Nocturnal birds (owls) were censused by soliciting calls along roads in the study area. Beginning approximately 1 hour after sunset, a section of road was censused by stopping every 0.4 km and listening for responses to tape recorded owl calls. Three to five minutes were spent at each locality. Normally, a 5 to 8 km section of road was traversed, with 12-20 listening stations monitored for a total of 48 to 80 minutes. The only species identified were Great horned owls (*Bubo virginianus*) and screech owls (*Otus asio*) (Table 46). Two calls were heard but not identified due to limited vocalization. Absolute densities are not possible from this type of census. Both species identified seem to be common throughout the study area.

Threatened and Endangered Species

No mammals, reptiles, or amphibians listed as threatened or endangered by the U.S. Fish and Wildlife Service (1979) were observed during this study in the Quemado, Driveway, or Malpais Planning Units of the Socorro District, BLM, New Mexico. No mammals, reptiles, or amphibians listed as endangered (Group 1 or 2) by the New Mexico State Game Commission (1979) were observed during this study in the Quemado, Driveway, or Malpais Planning Units of the Socorro District, BLM, New Mexico.

Table 46. Owl species identified in the study area. Due to length of transects driven, more than 1 habitat type was censused.

<u>Census Area</u>	<u>Primary Habitat Type(Code)</u>	<u>Date</u>	<u>Time At Each Station (minutes)</u>	<u>Stations</u>	<u>Species and Number of Responses</u>
Sandstone Bluffs	005/007	05-15-79	4	16	Great Horned (4) Screech Owl (1)
Quemado Lake	034	06-05-79	6	12	Great Horned (3) Screech Owl (2)
Narrows	005/007	06-21-79	3	12	Great Horned (2)
Pelona Mountain	005/007	07-10-79	3	12	Great Horned (4) Screech Owl (3) Unidentified (2)
Luna Road & U.S. 60 Junction	004	07-19-79	2	12	Great Horned (6) Screech Owl (2)
Narrows	018	07-26-79	3	14	Great Horned (3) Screech Owl (1)
Sandstone Bluffs	032	08-14-79	2	8	Great Horned (1) Screech (2)

Two bird species listed as endangered by the U.S. Fish and Wildlife Service and the New Mexico State Game Commission, and one bird species listed only by the New Mexico State Game Commission were observed on the study area. They are as follows:

Bald Eagle (*Haliaeetus leucocephalus*) (Federal and State Lists)

1. Sighted on 20 and 21 December 1979 near Pelona Mountain (Fig. 4) and recorded on Emlen transect, probably the same bird.
2. Sighted on 31 December 1979, 3.2 km east of U.S. Highway 60 and State Road 78 intersection, soaring 200 m north of Highway 60 (Fig. 4).

Peregrine Falcon (*Falco peregrinus anatum*) (Federal and State Lists)

1. Sighted on 22 August 1979 near transect No. 7, 5 km E and 2 km S of Quemado.
2. Sighted on 5 September 1979, 10 km east of Pie Town on U.S. Highway 60 (Fig. 4).
3. Sighted on 14 September 1979, 34 km south of Grants on Highway 117, at The Narrows (Fig. 4). This was an immature bird.
4. Sighted on 5 October 1979 at Luna Ranch, 22 km N Red Hill.

The Bald Eagle and Peregrine Falcon sightings were made under good weather conditions and were all positive identifications.

Bell's Vireo (*Vireo bellii*) (State List)

1. Sighted on 25 July 1979, 34 km south of Grants on Highway 117, at The Narrows (Fig. 5).
2. Sighted on 9 August 1979, at Site No. 18, and recorded on Emlen Transect, 43 km NE of Pie Town.

The Bell's vireos were seen at close range (one at 3 m) under good lighting and weather conditions and were positively identified.

We realize that the habitat in which these birds were observed does not represent "typical" Bell's Vireo habitat as described by Robbins et al. (1966) and Hubbard (1978). However, the occurrence of an occasional vagrant individual is entirely possible. The recording of an occasional vagrant individual does not justify management plans for that species.

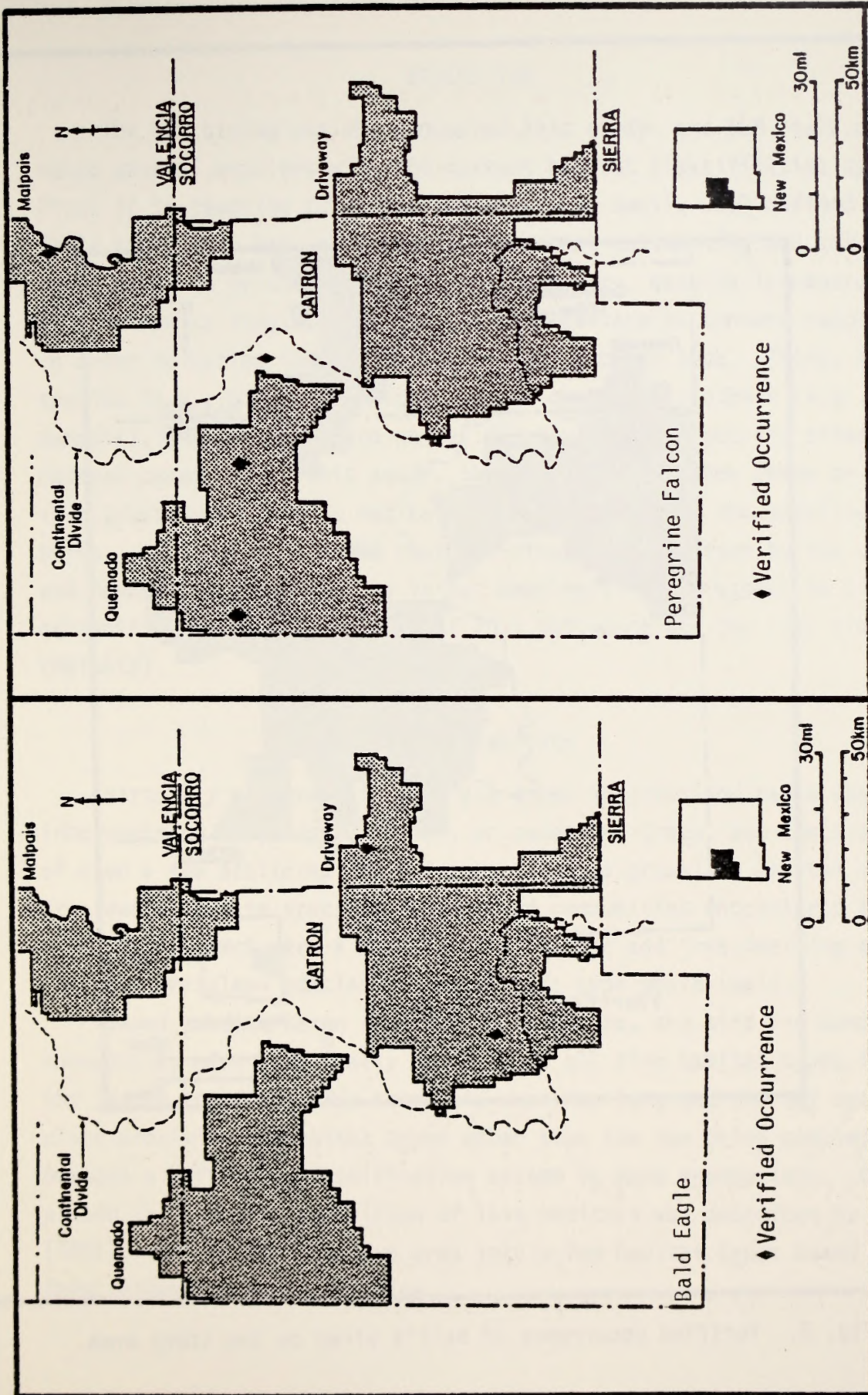


Fig. 4. Verified occurrences of bald eagles and peregrine falcons on the study area.

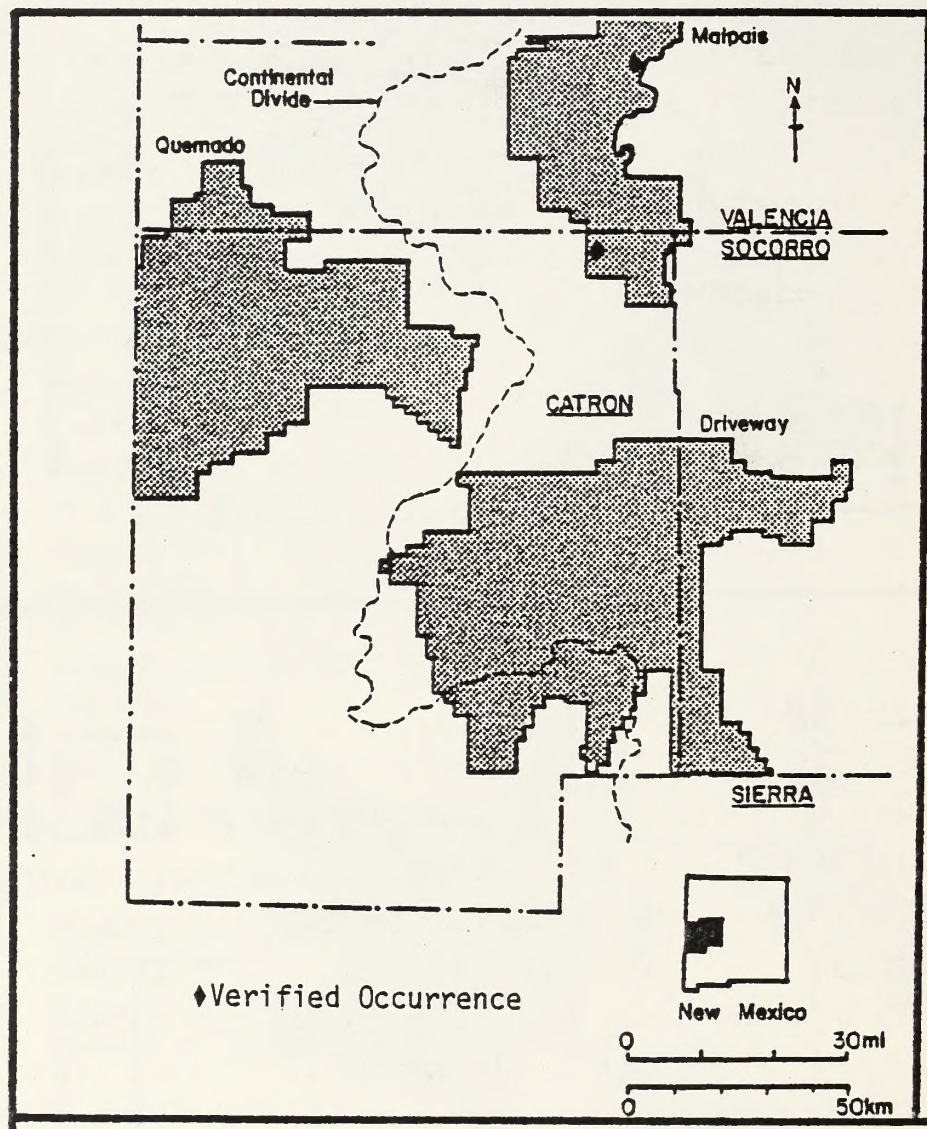


Fig. 5. Verified occurrence of Bell's vireo on the study area.

DISCUSSION

The LGL biologists who conducted this study and BLM field personnel noted several problems with the current habitat classification system. First it is tempting to divide habitats into small, well defined types. Field experience has, however, revealed that delineating and sampling small areas is neither practical nor necessary, especially regarding bird community studies. Second, it is necessary to conduct range surveys in order to define the parameters of each habitat type. Third, some species (e.g., birds) are highly mobile compared to others (e.g., small mammals), and are therefore not as closely tied to specific sites. In several cases during this study, the proximity of a few trees or shrubs in a grassland-dominated habitat markedly influenced the sampling of birds. In general it seems that defining a habitat type by the dominant and codominant plant species is not meaningful with respect to bird communities. The best example of this influence was the lava area (Malpais).

Malpais Habitats

Virtually all areas in the lava typed as grassland had a sparse interspersed of juniper, pinyon, or ponderosa trees, and the presence of even a few scattered trees in or near this grassland habitat attracted tree dwelling bird species. Thus, bird communities encountered along a 1.6 km transect were a mixture of grassland and tree dwelling species, not just grassland species as the habitat type would imply.

Based on data taken from 1.6 km transects, the bird and mammal communities were essentially the same on all five habitat types found on the lava. Possibly these transects were too long and thereby came in close proximity to habitat types other than the one being sampled, or perhaps a different classification system is more appropriate. One approach to a broader definition of lava habitats was described by Lindsey (1951). He divided the lava area into a few habitat types based on land form, elevation and vegetation.

Pinyon-Juniper Habitats

No significant difference in species diversity was detected in mammal or bird communities occupying habitat types 005/007, 008, and 009. The 005/007 type (*Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Hill), was frequently difficult to separate from type 008 (*Pinus edulis/Juniperus monosperma* - Mesa). Since there was no marked difference in mammal or bird communities between these types, they should probably be grouped together.

Habitats Incorrectly Typed

During the initial field visits several discrepancies were noted with respect to habitat classification. Transect location sites were often difficult to select because of questionable vegetation associations. One type (015) *Pinus ponderosa/Bouteloua gracilis* - Mountain, in the malpais was not sampled because the ponderosa pine stands were so small and scattered that a 1.6 km (1 m) transect within the type was not possible.

Site No. 7 (Type 036) *Chrysothamnus nauseosus/Fallugia paradoxa* - Intermittent Stream Riparian, was, in fact, a *Chrysothamnus nauseosus*/?-Gully. There was little if any *Fallugia paradoxa* present and the Intermittent Stream Riparian was simply an erosion cut in deep sandy soil. This type needs to be corrected.

Site No. 21 (032) *Atriplex canescens/Bouteloua gracilis* - Valley has a large amount of sagebrush (*Artemisia* sp.) associated with it and needs to be rechecked as to proper type identification.

Site No. 25 (Type 002) *Xanthocephalum sarothrae/Bouteloua gracilis* - Hill, was delineated as a much larger area than what actually existed. In order to lay out a 1.6 km transect on BLM land, we found it necessary to place the transect site in an area having scattered pinyon-juniper and lava outcrops throughout.

Importance of Habitat Types to Wildlife

The habitat type generally supporting the largest number of species, both birds and mammals, is *Pinus edulis/Juniperus monosperma/Bouteloua gracilis* - Hill, (005/007). The more intensive sampling within this

type may account for some of the additional species; however, the diversity of microhabitats within this type probably contributes significantly to its diverse wildlife community. Seventy-seven bird species and 29 mammal species were documented in this type. Extensive loss of this habitat type would impact a large number of wildlife species. Habitat types 008 and 009 support similar communities and all three types (005/007, 008, and 009) would respond in a similar manner to habitat alteration or loss. Alteration of pinyon-juniper habitat, if properly done, could enhance the type as wildlife habitat for additional species by creating edge and openings (Table 47).

Two other habitat types support diverse wildlife communities, *Pinus edulis*/*Fallugia paradoxa* - Mountain (034). Fifty-two and 47 species of birds were documented in these types, respectively. Mammal species numbers were represented by 10 and 16, respectively. In the case of type 034, presence of a canyon made this site suitable for consideration as an intermittent stream riparian. Also, a small lake apparently contributed to the presence of several species. Severe alteration of these habitat types (i.e., surface mining) should be discouraged. The maintenance of waterbodies (lakes, ponds, streams, etc.) should be of high priority, and tree removal (lumber, firewood, etc.) should be done on a selective basis.

Grassland habitat types (002, 004, 011, 014, 016, 022, and 032) were generally represented by low bird species diversities. Two of these types (002 and 032) had fairly high numbers of bird species; however, in both types, occurrence of scattered trees resulted in the presence of additional non-grassland bird species. On the grassland types, mammal species that would be adversely impacted by grassland destruction are the pronghorn, Gunnison's prairie dog, kit fox, and badger.

Lava habitat types (018, 019/020, 021, 031) were generally comparable in terms of mammal and bird species numbers. Habitat type 019/020 was noticeably more diverse in bird species than the others, but vegetation was also more diverse than any other site within this type. This type does not readily lend itself to development; however, following any type of habitat alteration or destruction, recovery of flora and fauna would be extremely slow.

Table 47. Numbers of bird and mammal species observed, by habitat type, in the Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Habitat Type</u>	<u>No. of Bird Species</u>	<u>No. of Mammal Species</u>	<u>Sensitive Species</u>
002	33	17	Silky picket mouse Thirteen-lined ground squirrel Gunnison's prairie dog Kit fox Badger Pronghorn antelope
004	18	12	Botta's pocket gopher Gunnison's prairie dog Pronghorn antelope
005/007	77	29	Pinyon mouse Cliff chipmunk Botta's pocket gopher Gray fox Black bear Ringtail Long-tailed weasel Mountain lion Bobcat Mule deer
008	28	12	Pinyon mouse Bobcat Mule deer
009	36	14	Pinyon mouse Cliff chipmunk Gray fox Black bear Ringtail Long-tailed weasel Mountain lion Mule deer
011	15	12	White-tailed antelope squirrel Badger Pronghorn antelope
014	14	6	Western harvest mouse Gunnison's prairie dog Golden eagle

Table 47. (continued)

Habitat Type	No. of Bird Species	No. of Mammal Species	Sensitive Species
016	14	11	Gunnison's prairie dog Pronghorn antelope
018	18	11	Pinyon mouse Gray-collared chipmunk Abert's squirrel Long-tailed weasel Mule deer
019/020	36	16	Shrew sp. Ringtail Long-tailed weasel Mule deer
021	26	15	Silky pocket mouse Long-tailed weasel Mule deer
022	9	10	Northern grasshopper mouse White-tailed antelope squirrel Thirteen-lined ground squirrel Kit fox Badger Pronghorn antelope
026	52	10	Mule deer
031	27	13	White-tailed antelope squirrel Ringtail
032	21	8	Silky pocket mouse Northern grasshopper mouse
034	47	16	Gray-collared chipmunk Golden-mantled ground squirrel Abert's squirrel Black bear Long-tailed weasel Mountain lion Bobcat Elk Mule deer Bald eagle Williamson's sapsucker Yellow-bellied sapsucker
036	21	10	Banner-tailed kangaroo rat Western harvest mouse Bendire's thrasher

Habitat type 036, which we feel was misidentified, was represented by 21 bird species, and 10 mammal species. Although the type supported a fairly wide variety of birds, it was not a particularly sensitive area and appeared to be a severely overgrazed grassland. Diversity may be partially explained by the presence of pinyon-juniper nearby.

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APPENDIX 1

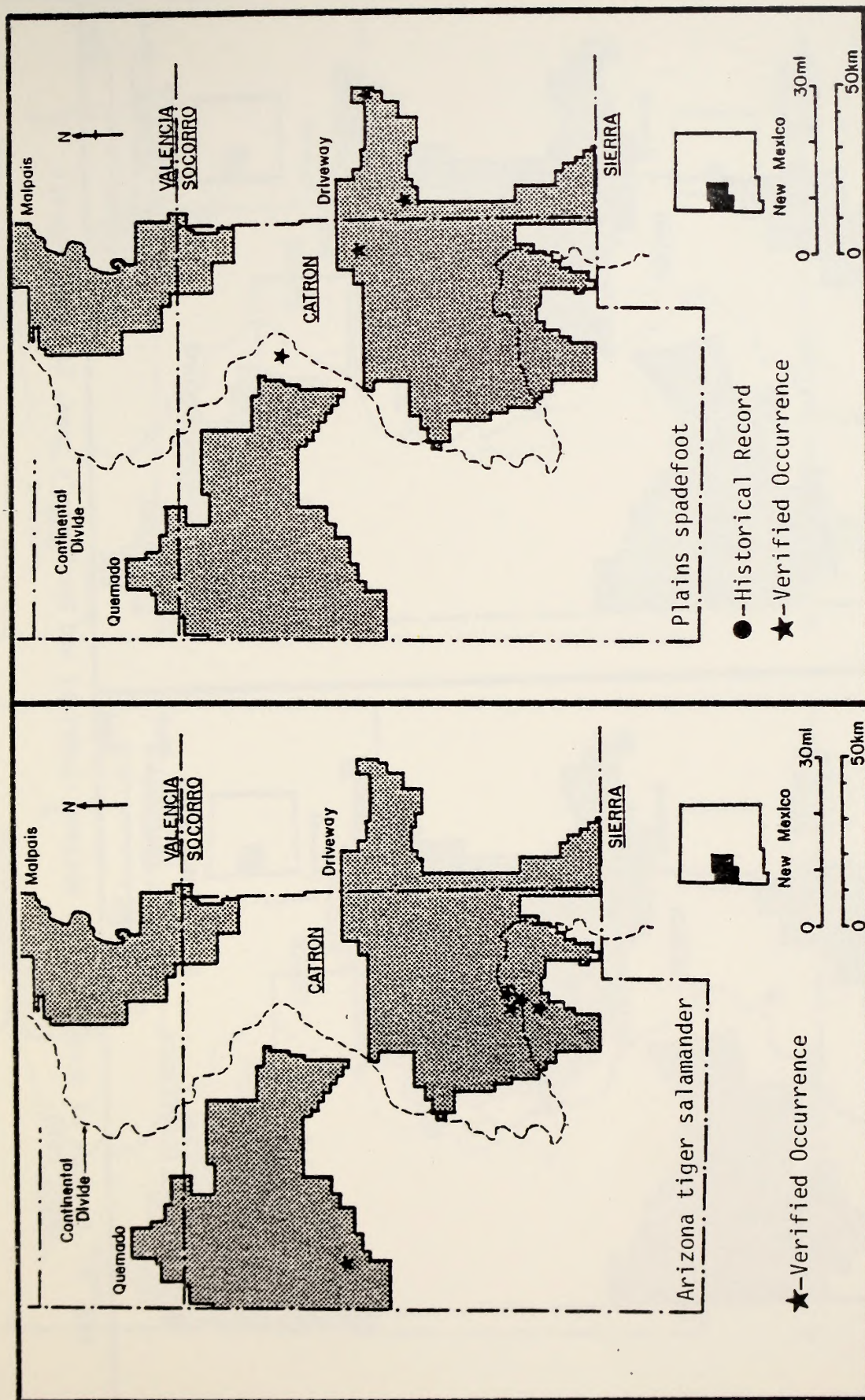


Fig. 6. Records of occurrence for Arizona tiger salamander and Plains spadefoot, Socorro District, BLM, 1979.

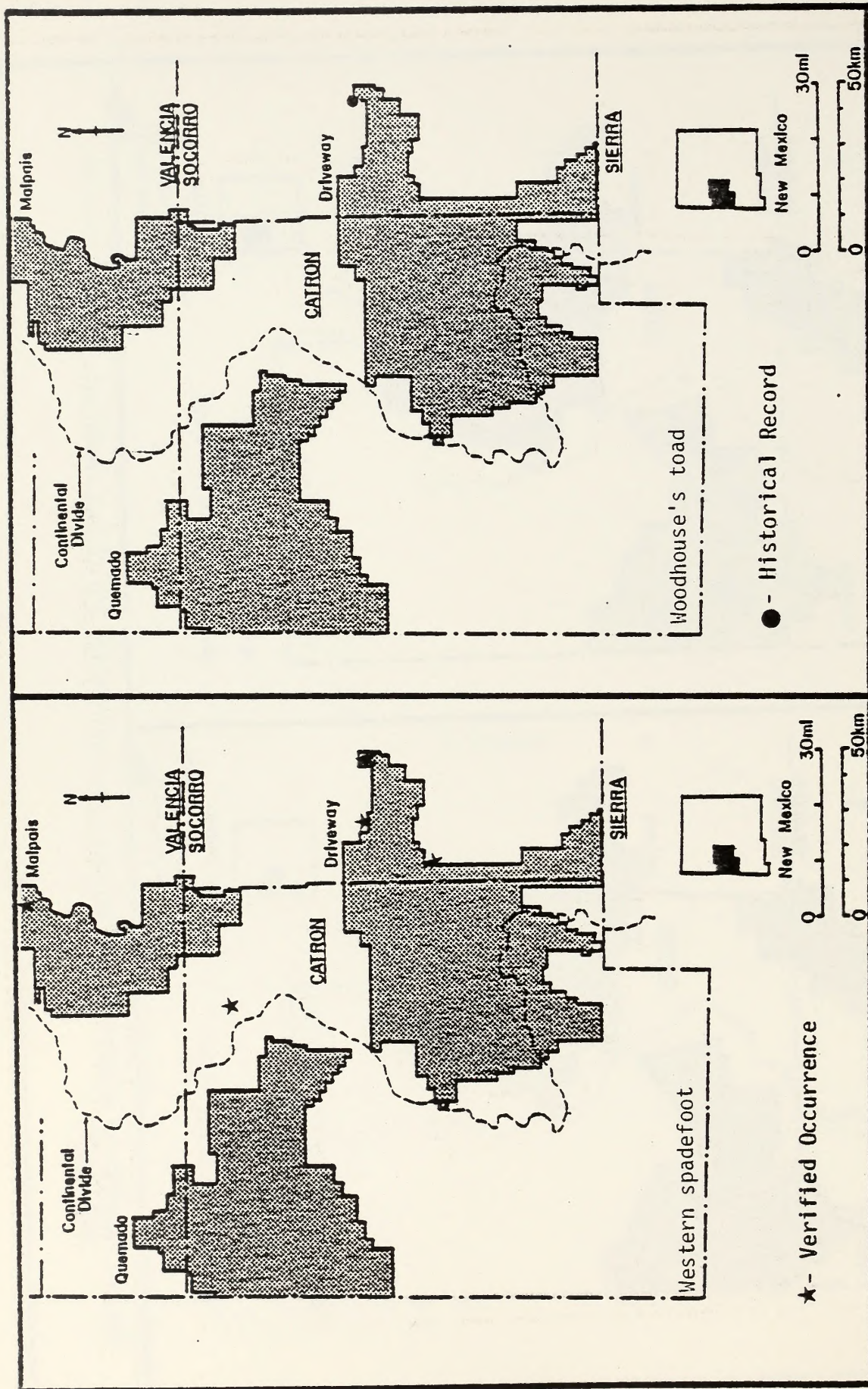


Fig. 7. Records of occurrence for Western spadefoot and Woodhouse's toad, Socorro District, BLM, 1979.

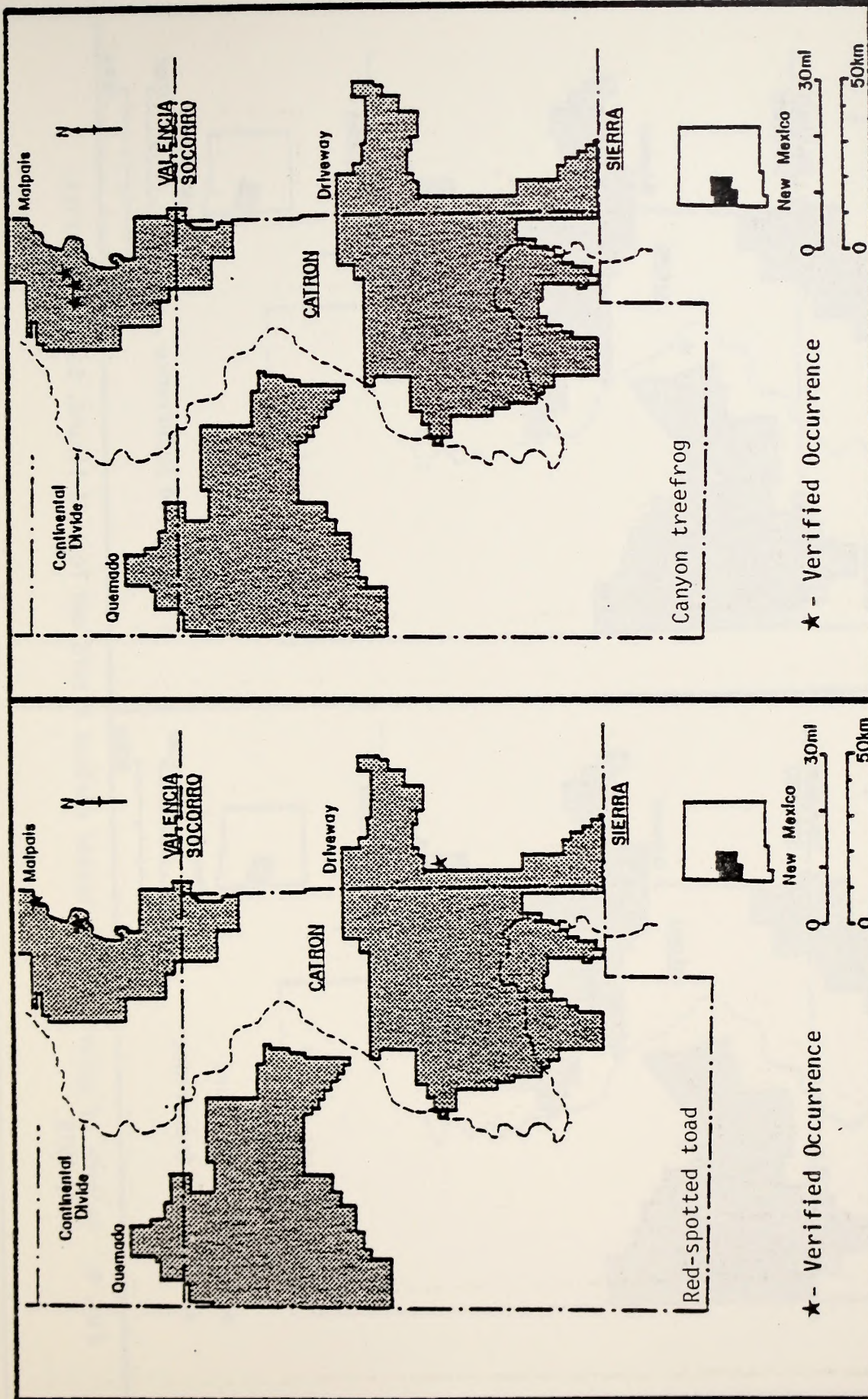


Fig. 8. Records of occurrence for red-spotted toad and canyon treefrog, Socorro District, BLM, 1979.

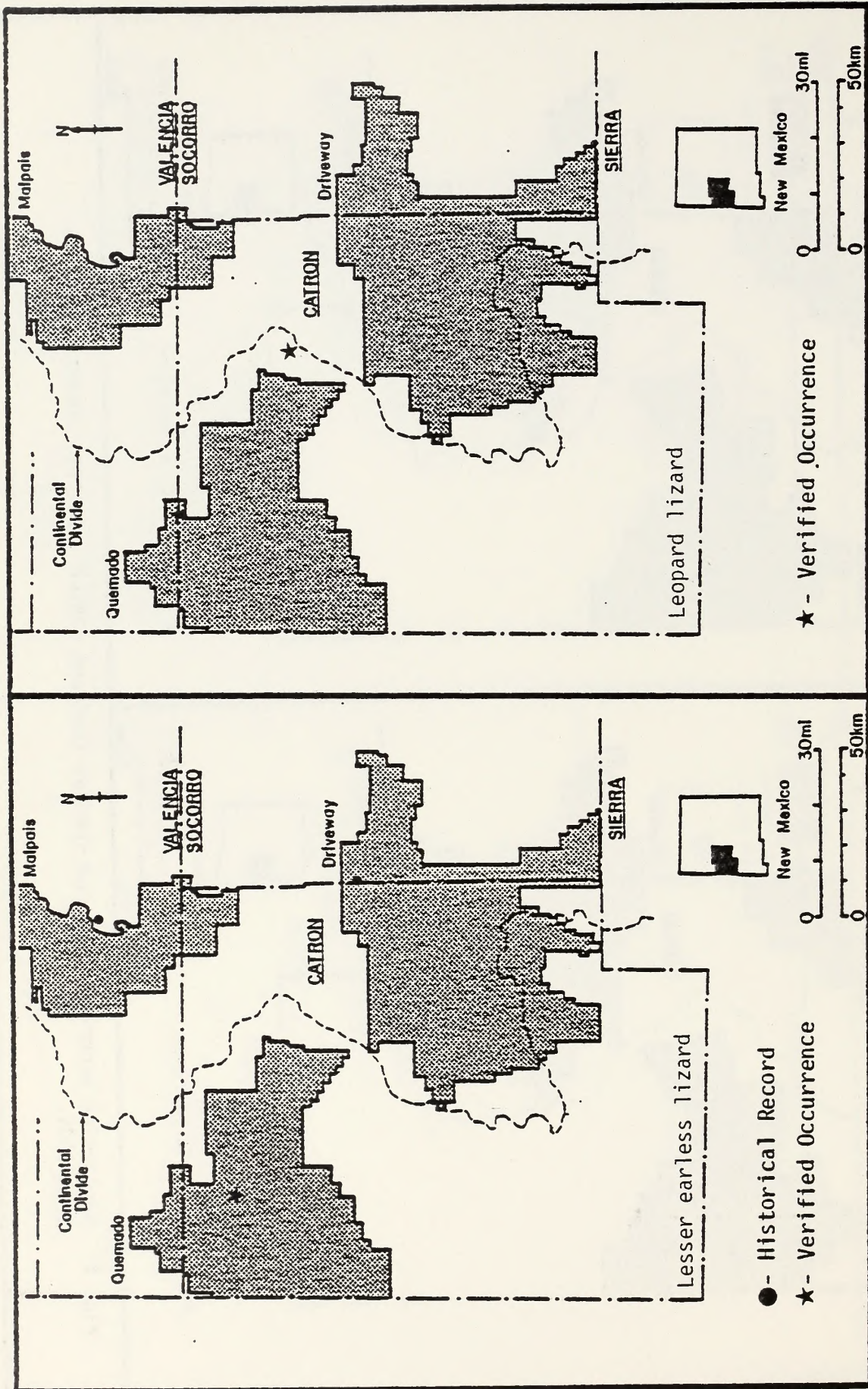


Fig. 9. Records of occurrence for lesser earless lizard and leopard lizard, Socorro District, BLM, 1979.

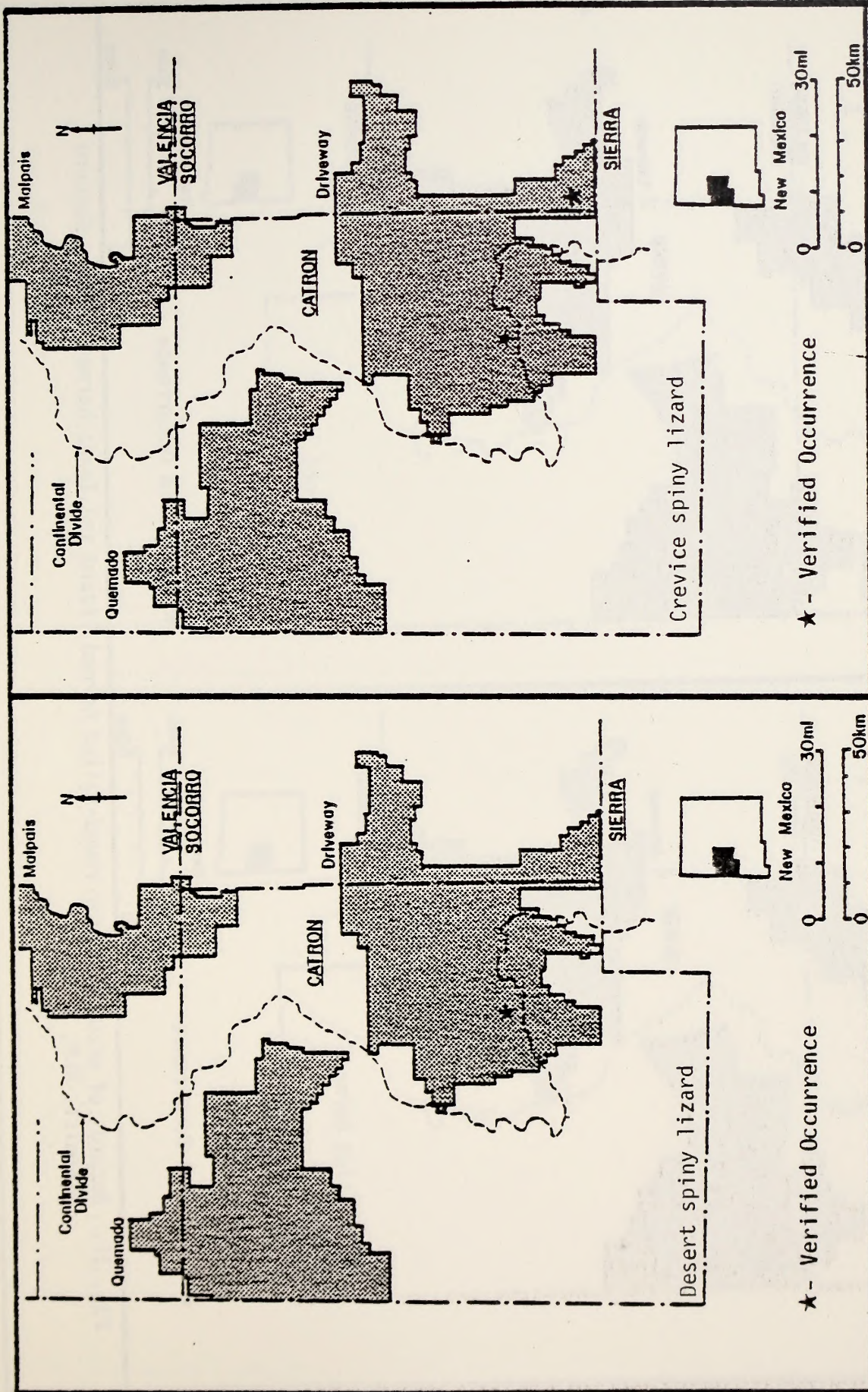


Fig. 10. Records of occurrence for desert spiny lizard and crevice spiny lizard, Socorro District, BLM, 1979.

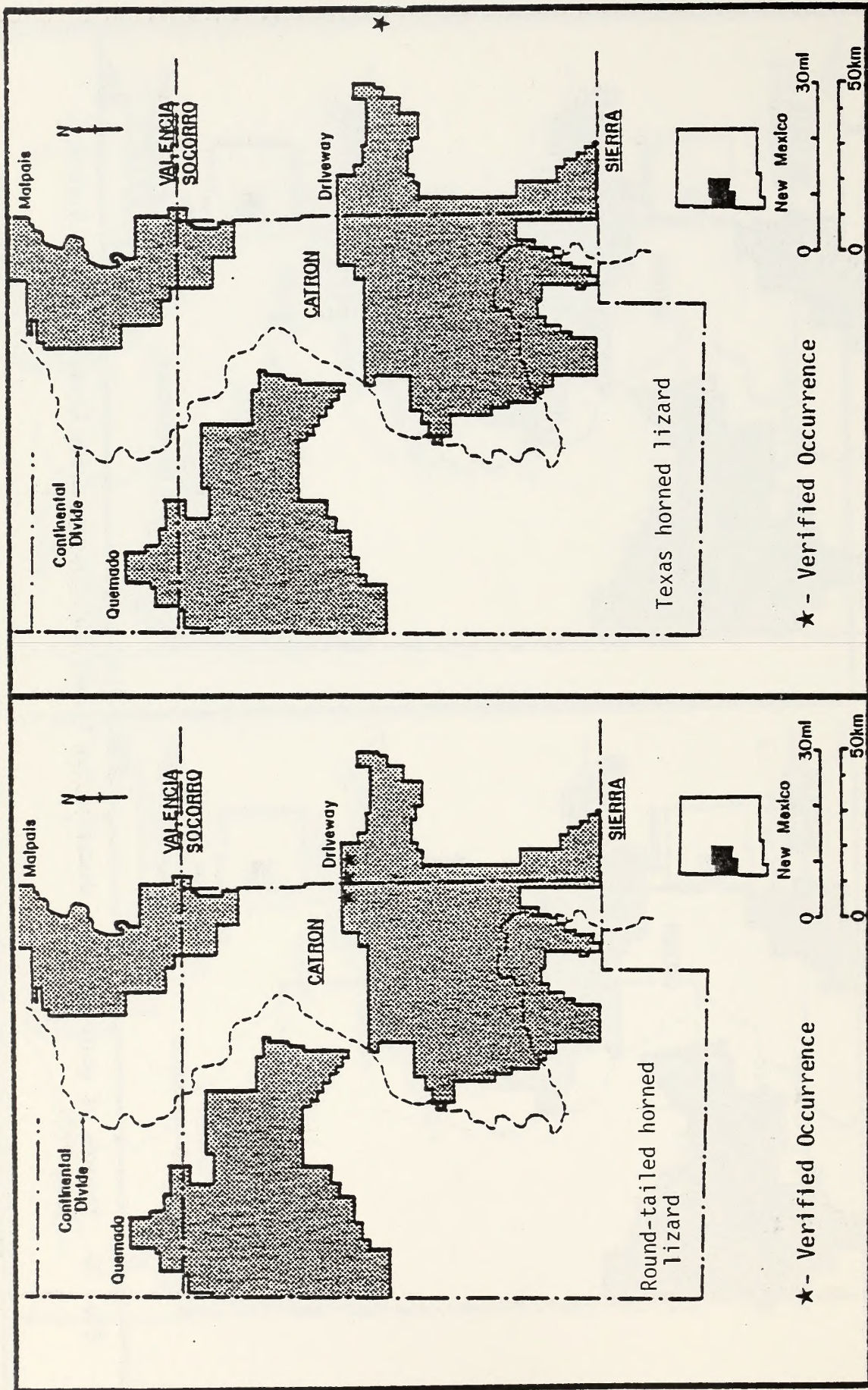


Fig. 11. Records of occurrence for round-tailed horned lizard and Texas horned lizard, Socorro District, BLM, 1979.

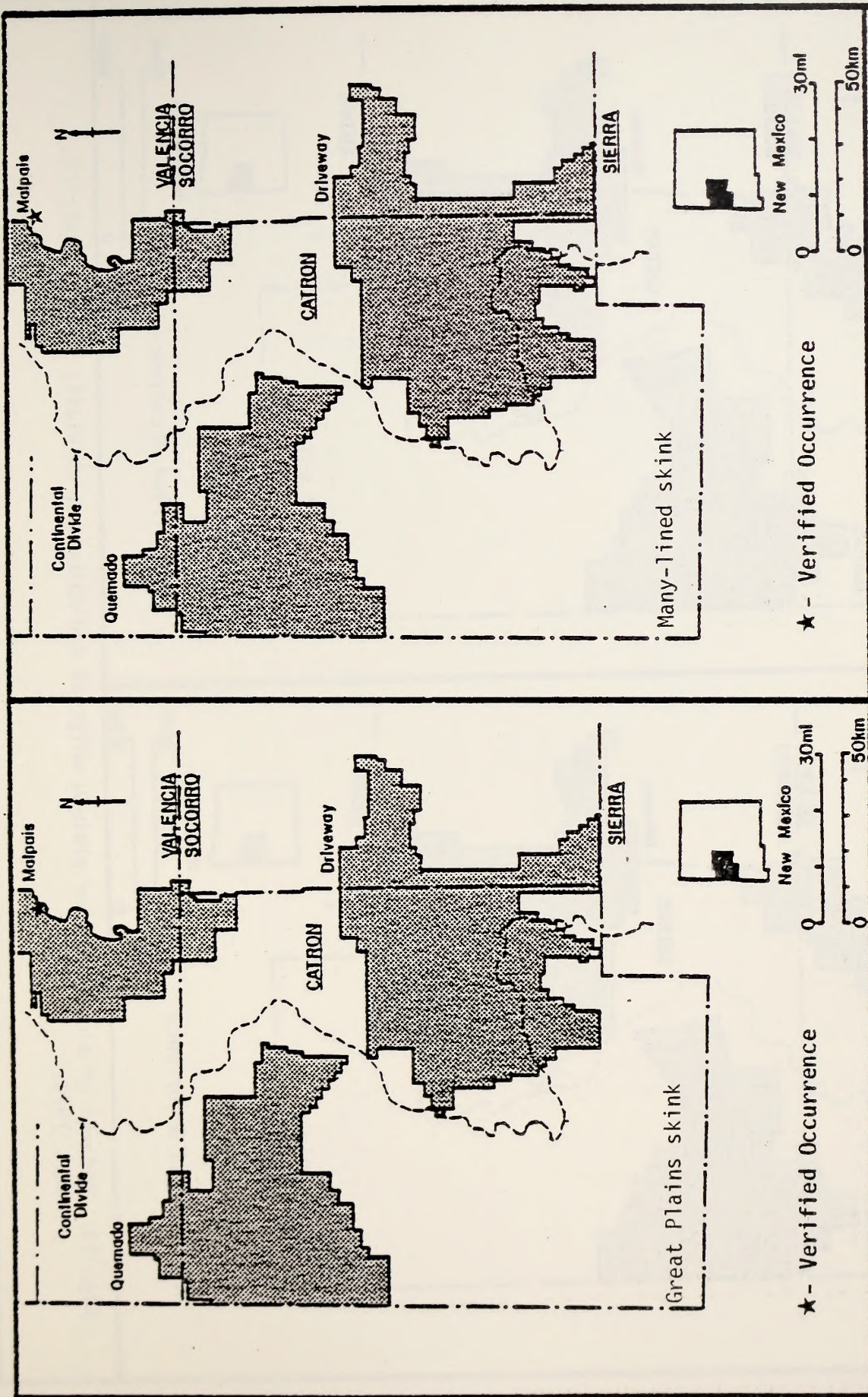


Fig. 12. Records of occurrence for Great Plains skink and many-lined skink, Socorro District, BLM, 1979.

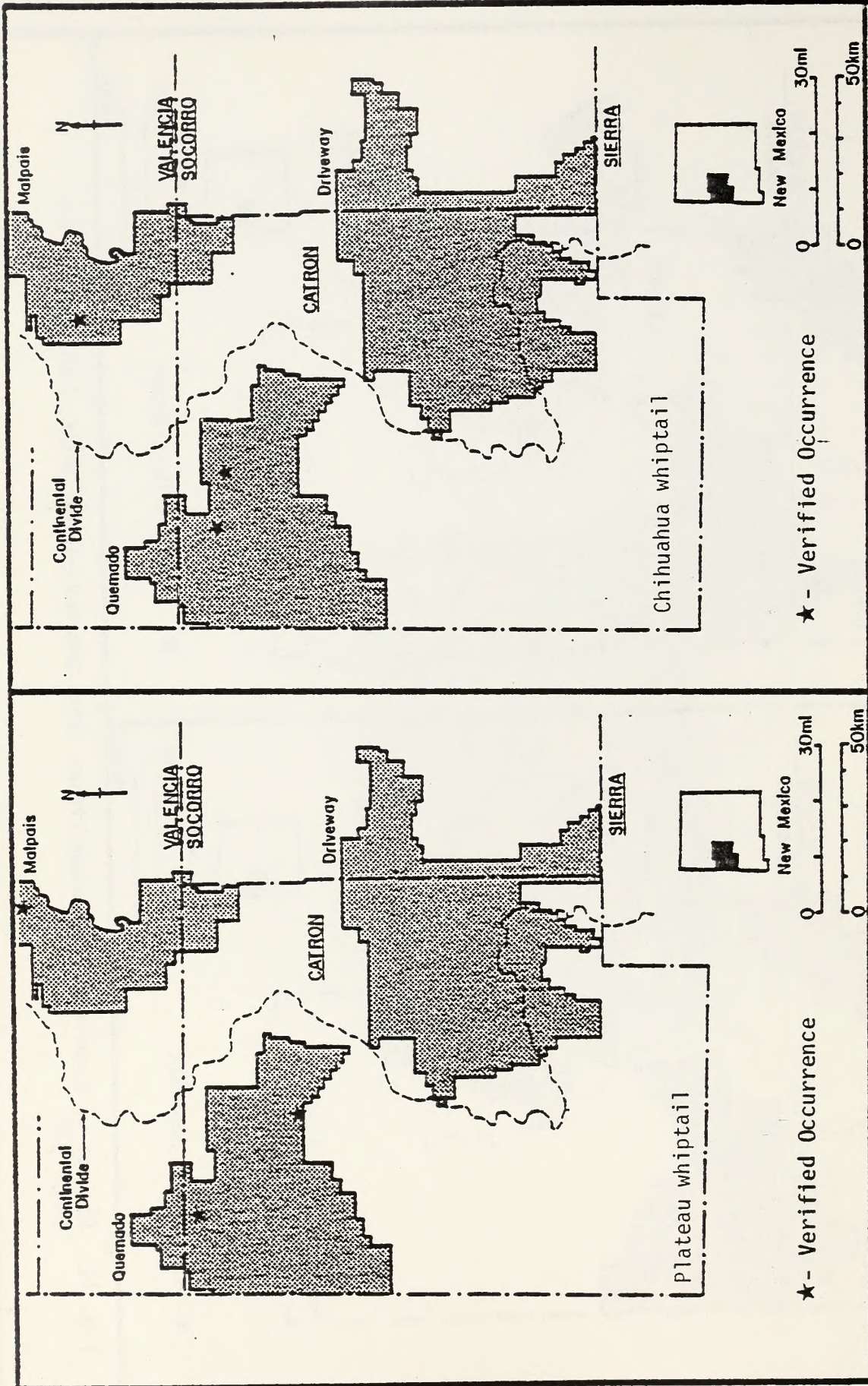


Fig. 13. Records of occurrence for plateau whiptail and chihuahuah whiptail, Socorro District, BLM, 1979.

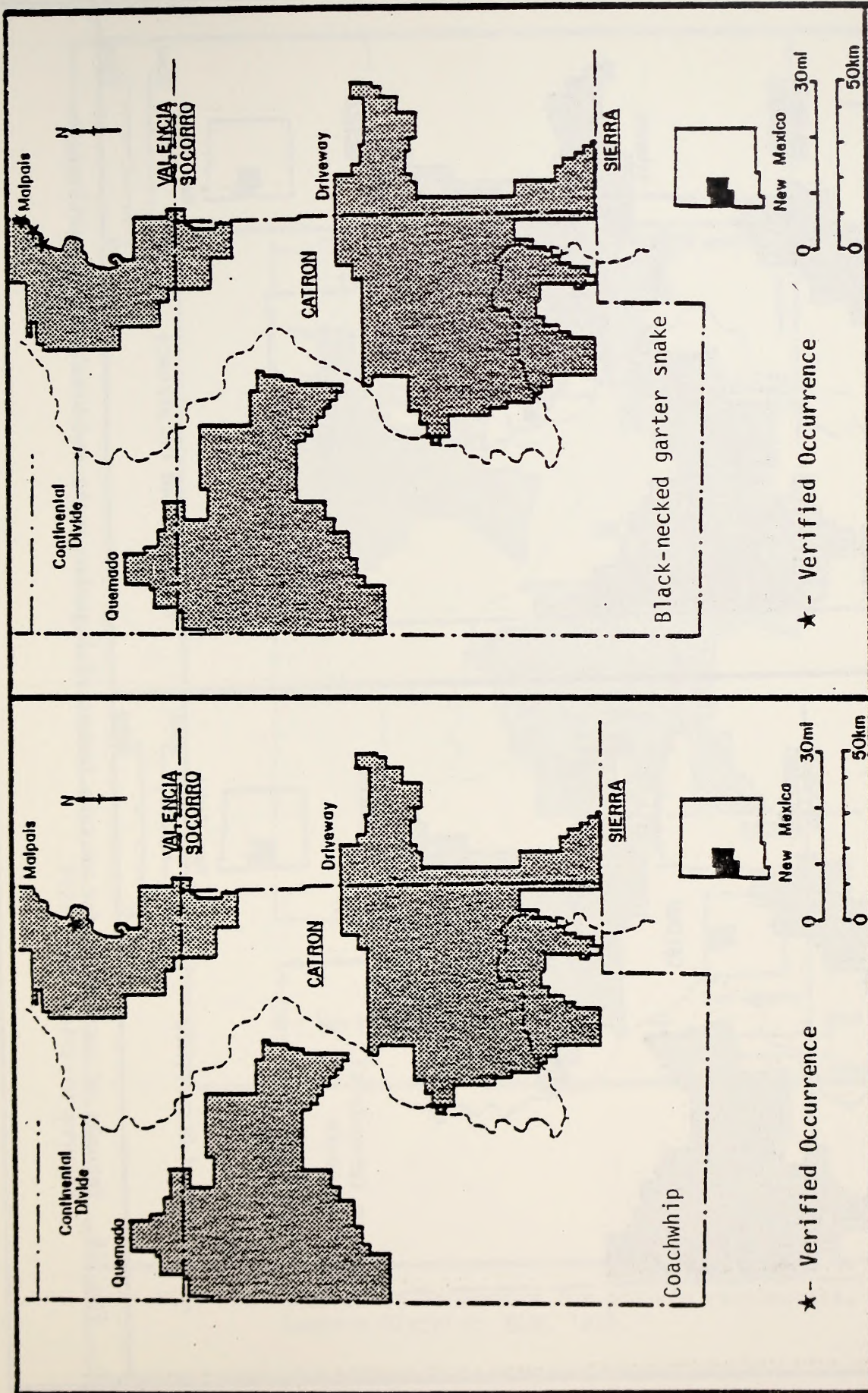


Fig. 14. Records of occurrence for coachwhip and black-necked garter snake, Socorro District, BLM, 1979.

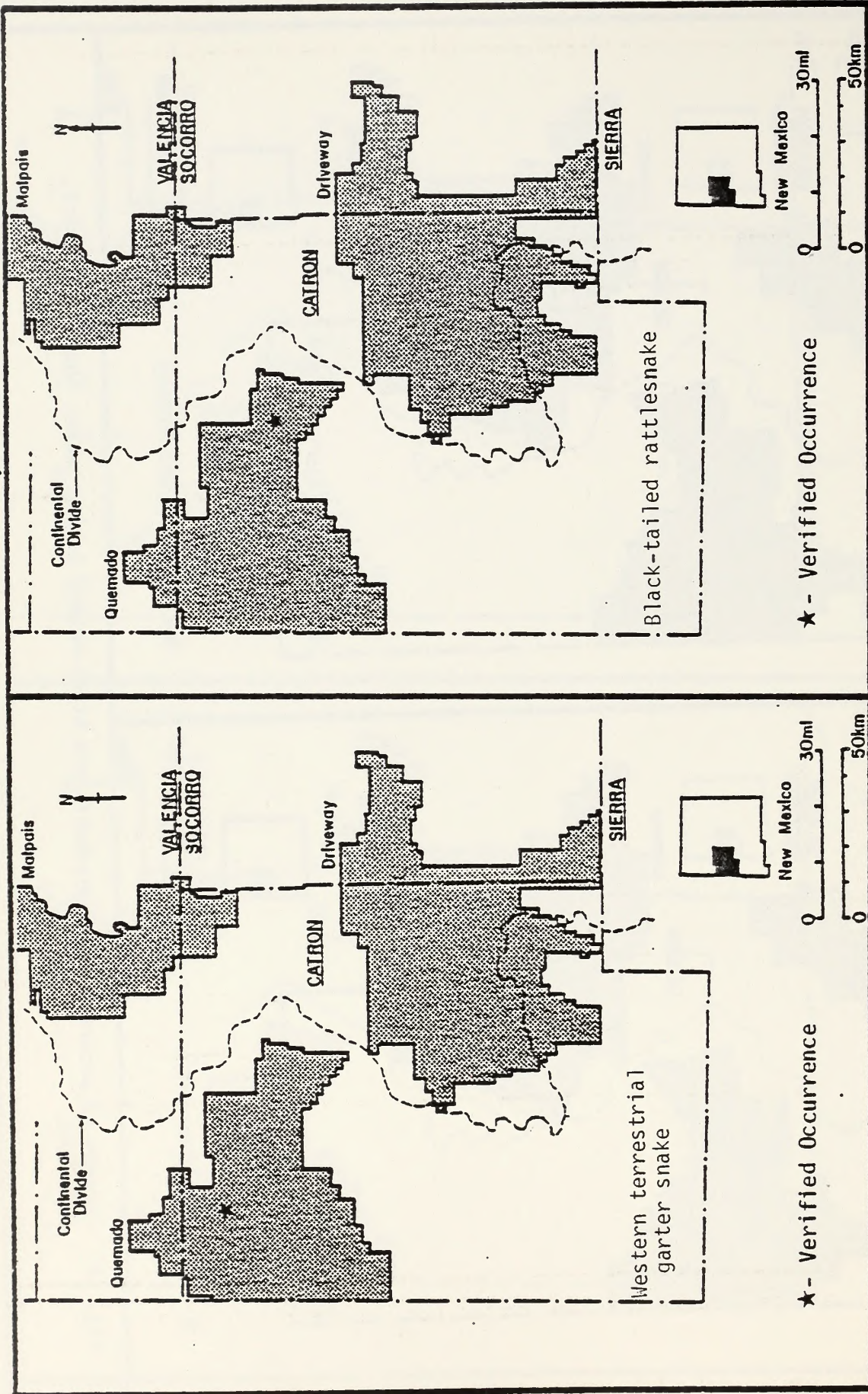


Fig. 15. Records of occurrence for western terrestrial garter snake and black-tailed rattlesnake, Socorro District, BLM, 1979.

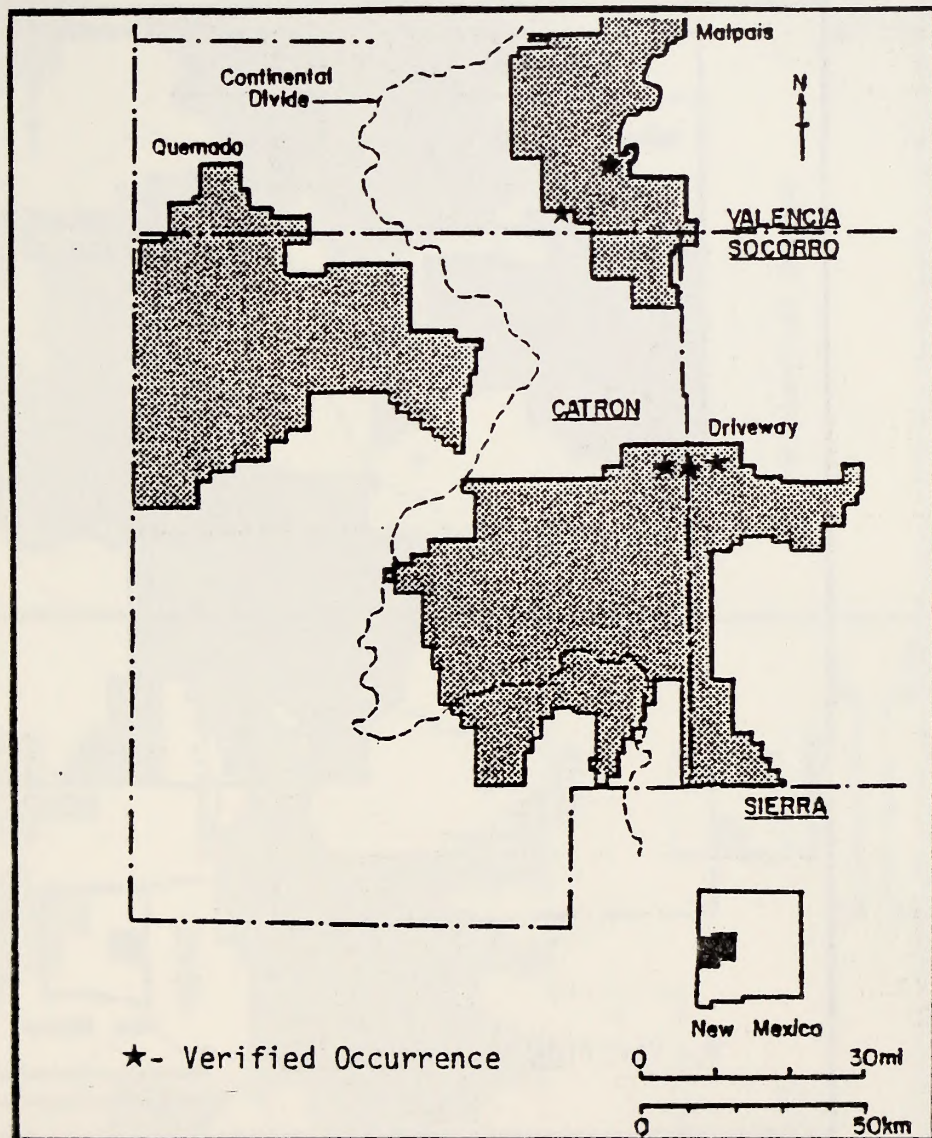


Fig. 16. Records of occurrence for prairie rattlesnake, Socorro District, BLM, 1979.

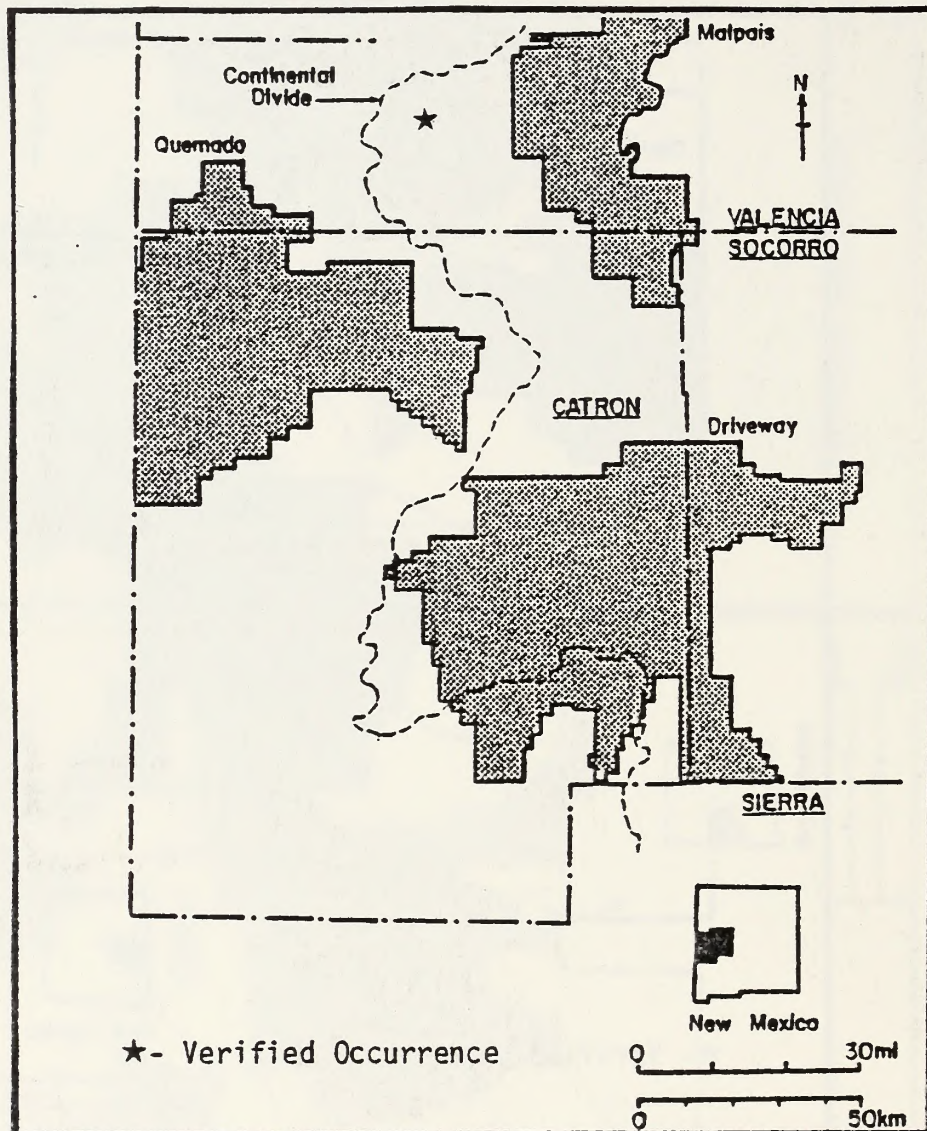


Fig. 17. Records of occurrence for dwarf shrew, Socorro District, BLM, 1979.

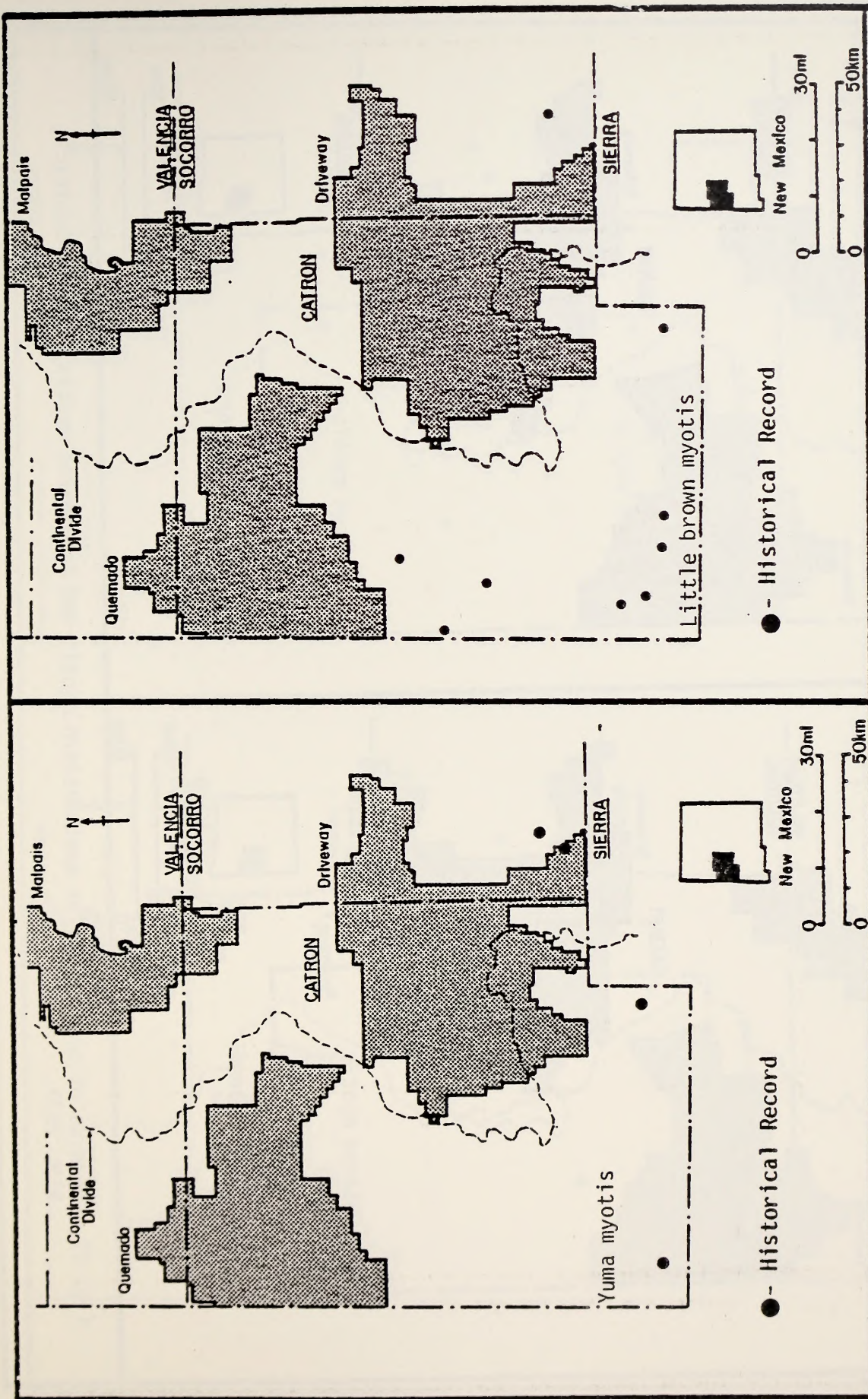


Fig. 18. Records of occurrence for yuma myotis and little brown myotis, Socorro District, BLM, 1979.

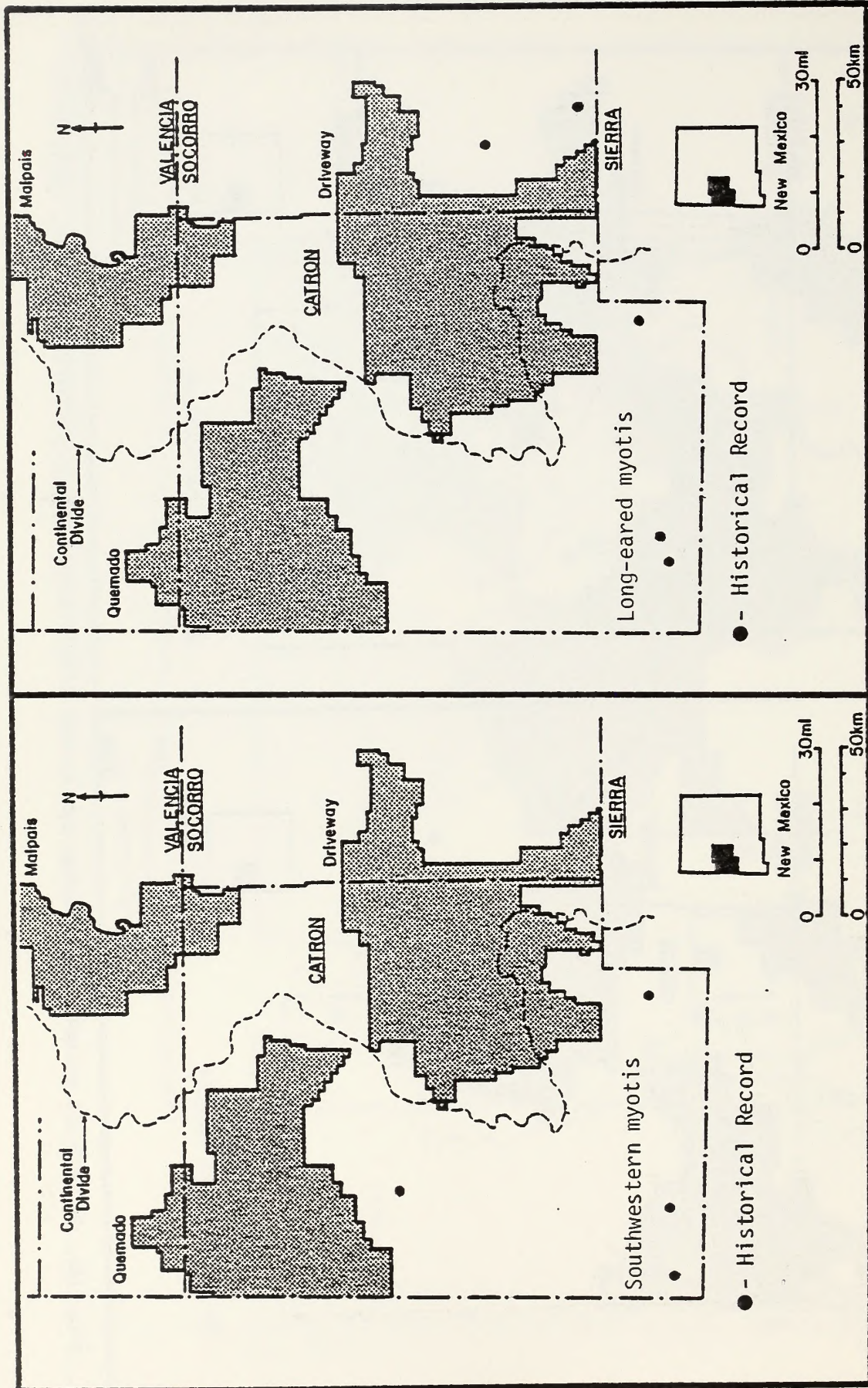


Fig. 19. Records of occurrence for southwestern myotis and long-eared myotis, Socorro District, BLM, 1979.

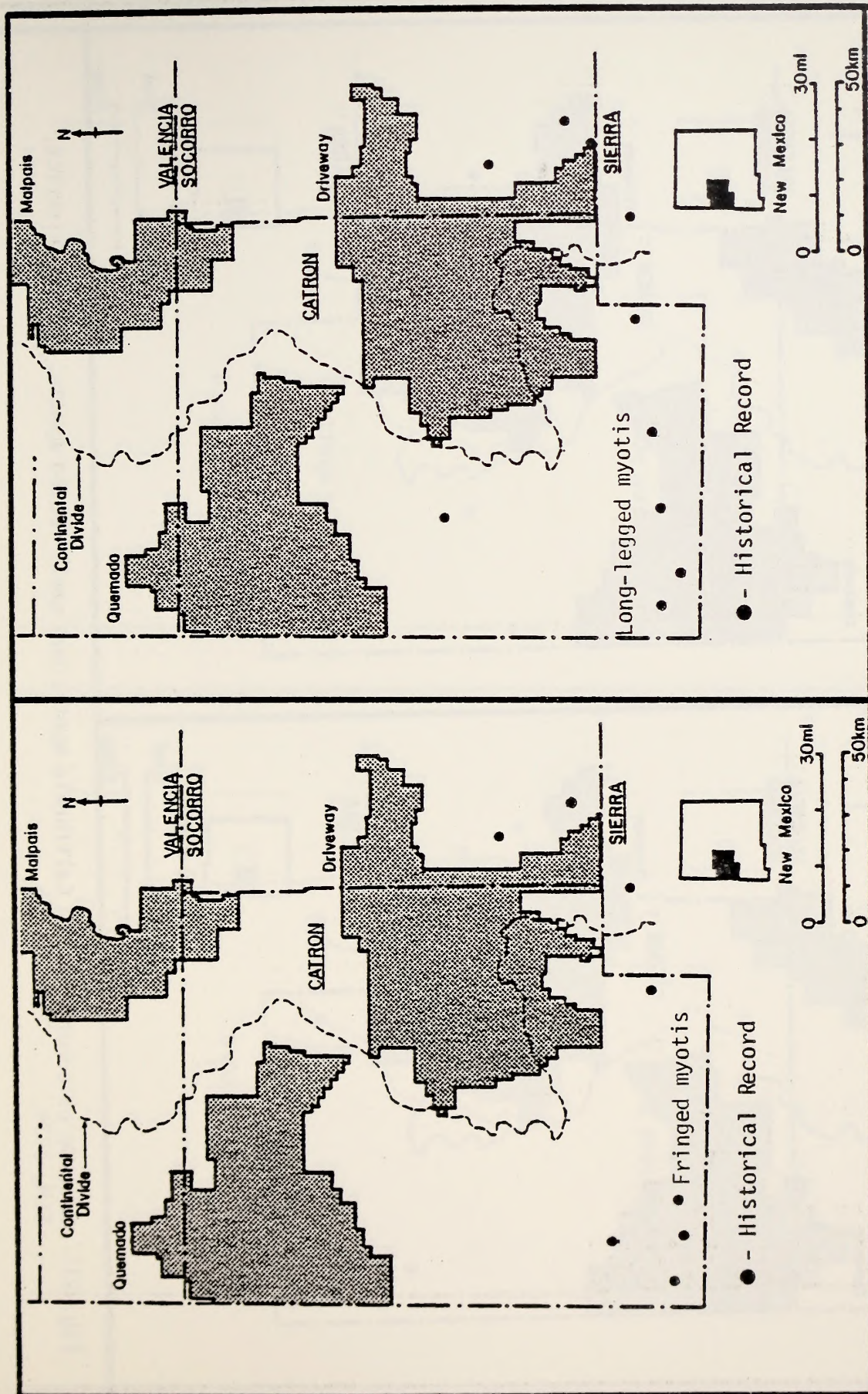


Fig. 20. Records of occurrence for fringed myotis and long-legged myotis, Socorro District, BLM, 1979.

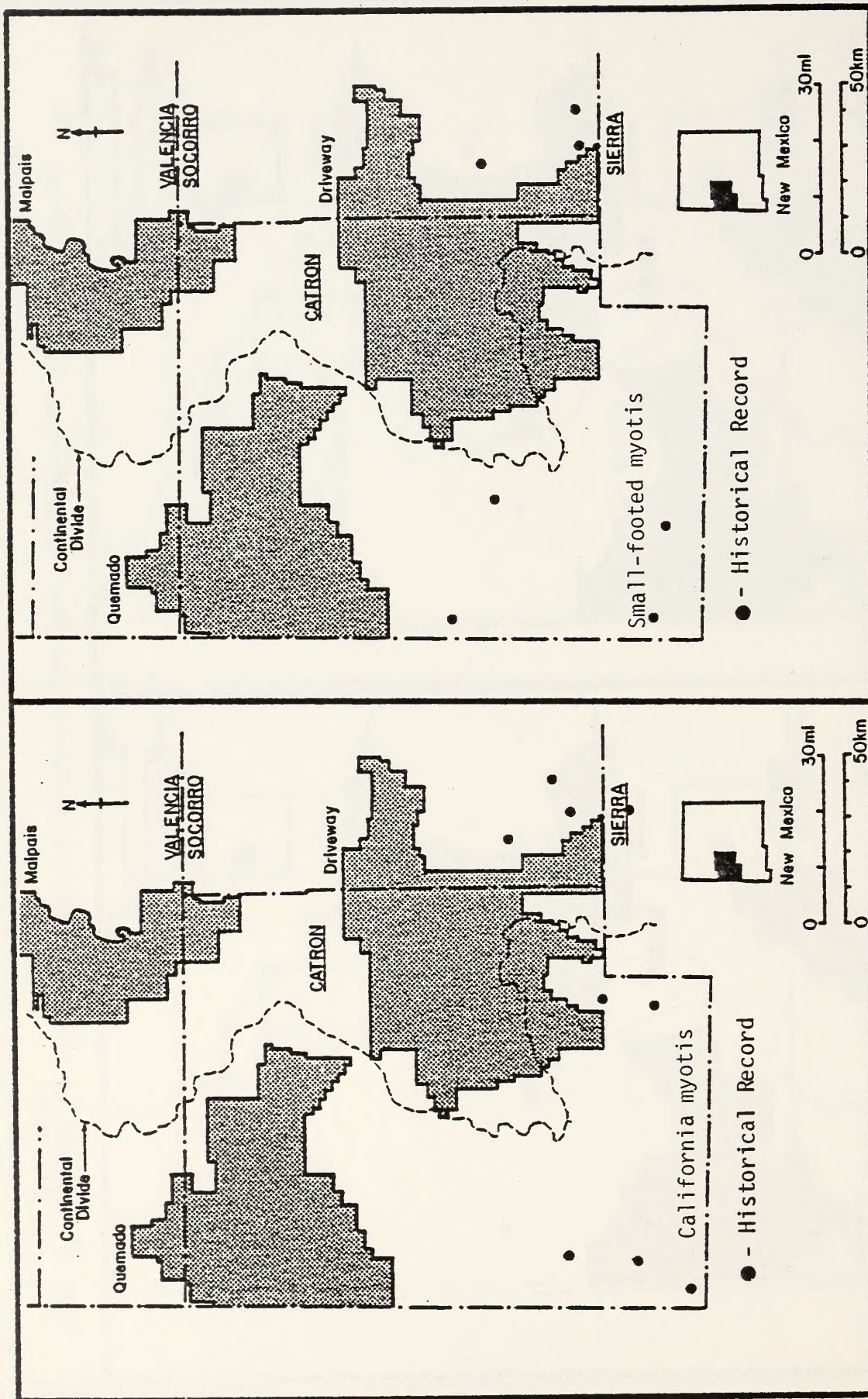


Fig. 21. Records of occurrence for California myotis and small-footed myotis, Socorro District, BLM, 1979.

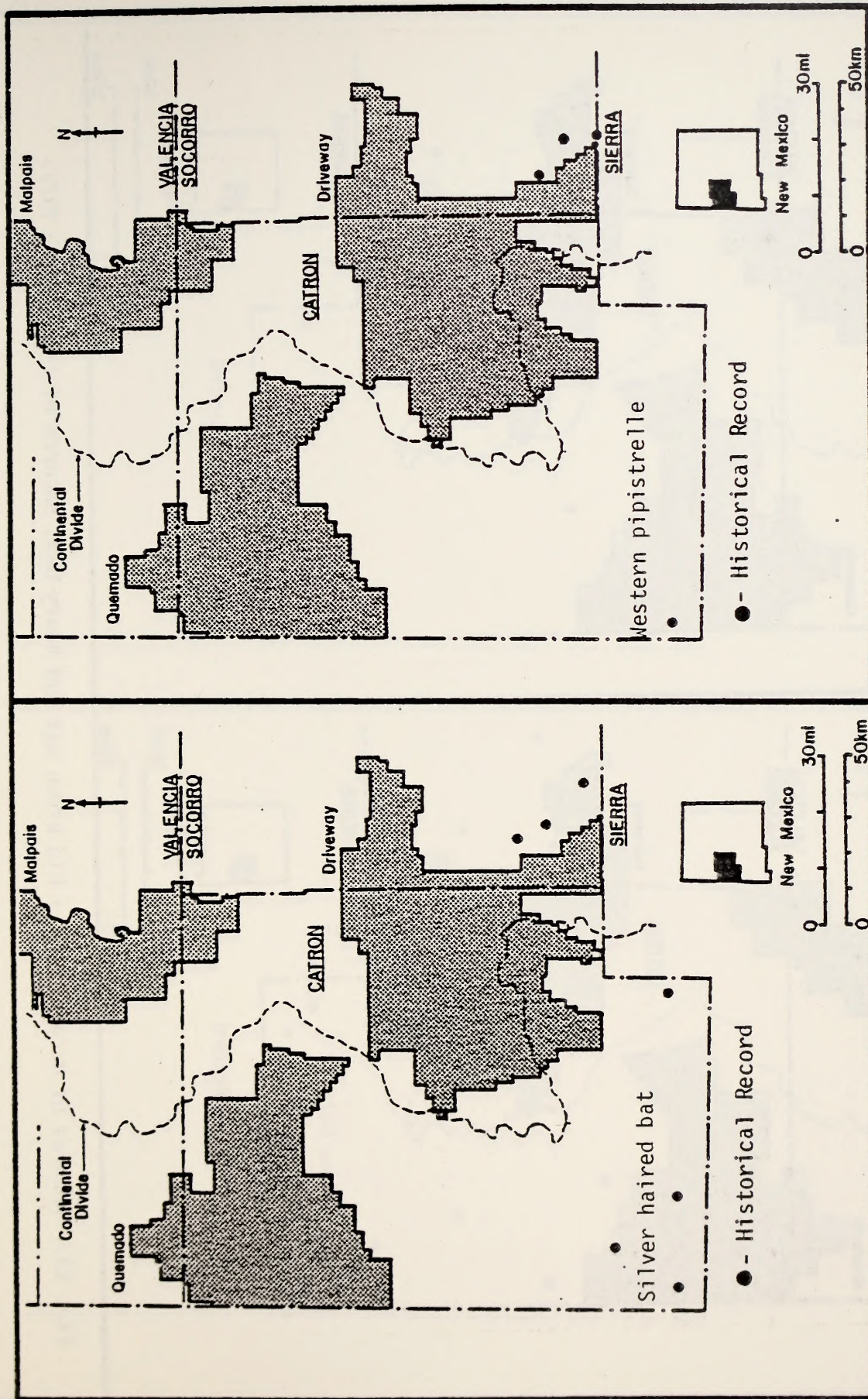


Fig. 22. Records of occurrence for silver-haired bat and western pipistrelle, Socorro District, BLM, 1979.

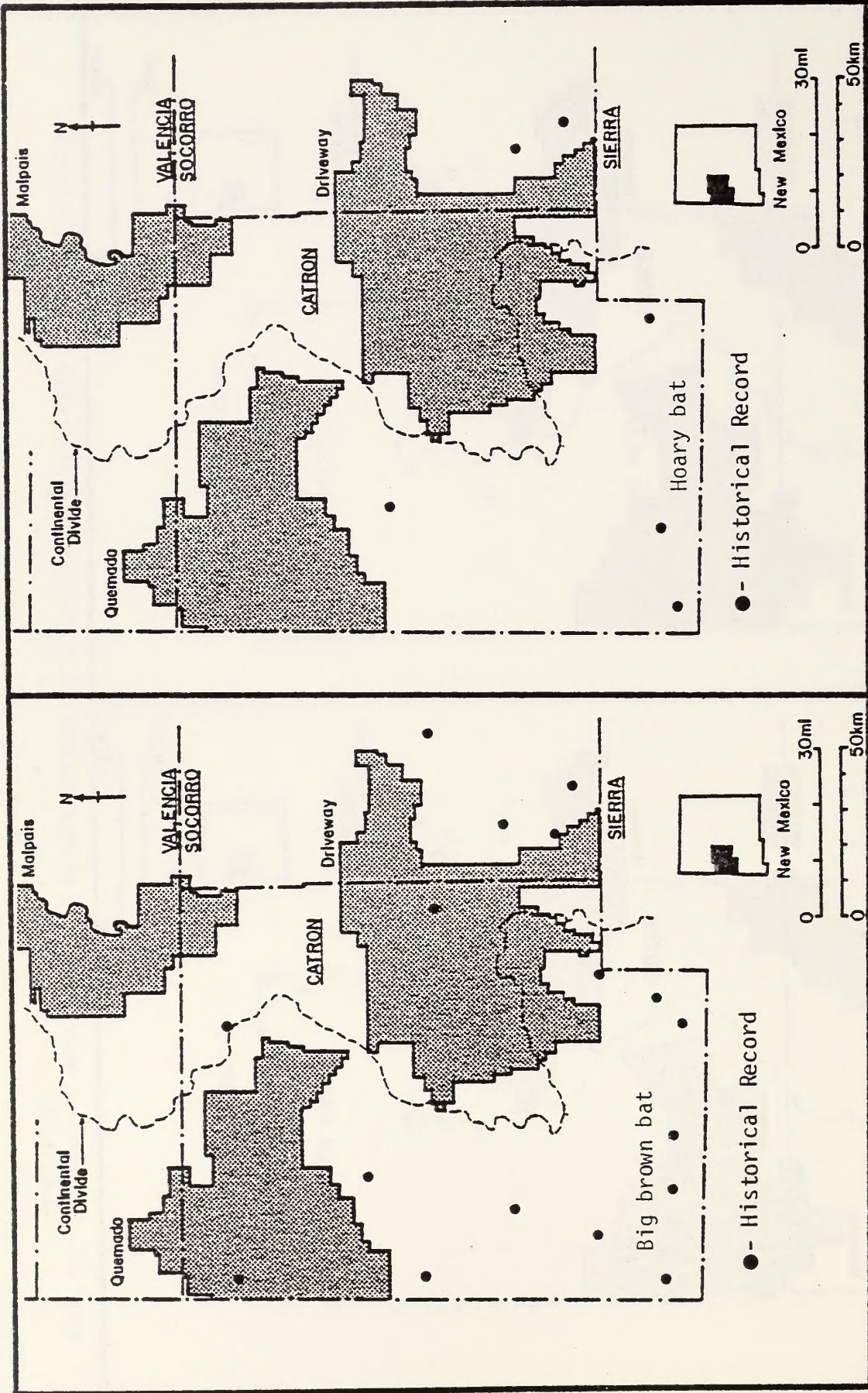


Fig. 23. Records of occurrence for big brown bat and hoary bat, Socorro District, BLM, 1979.

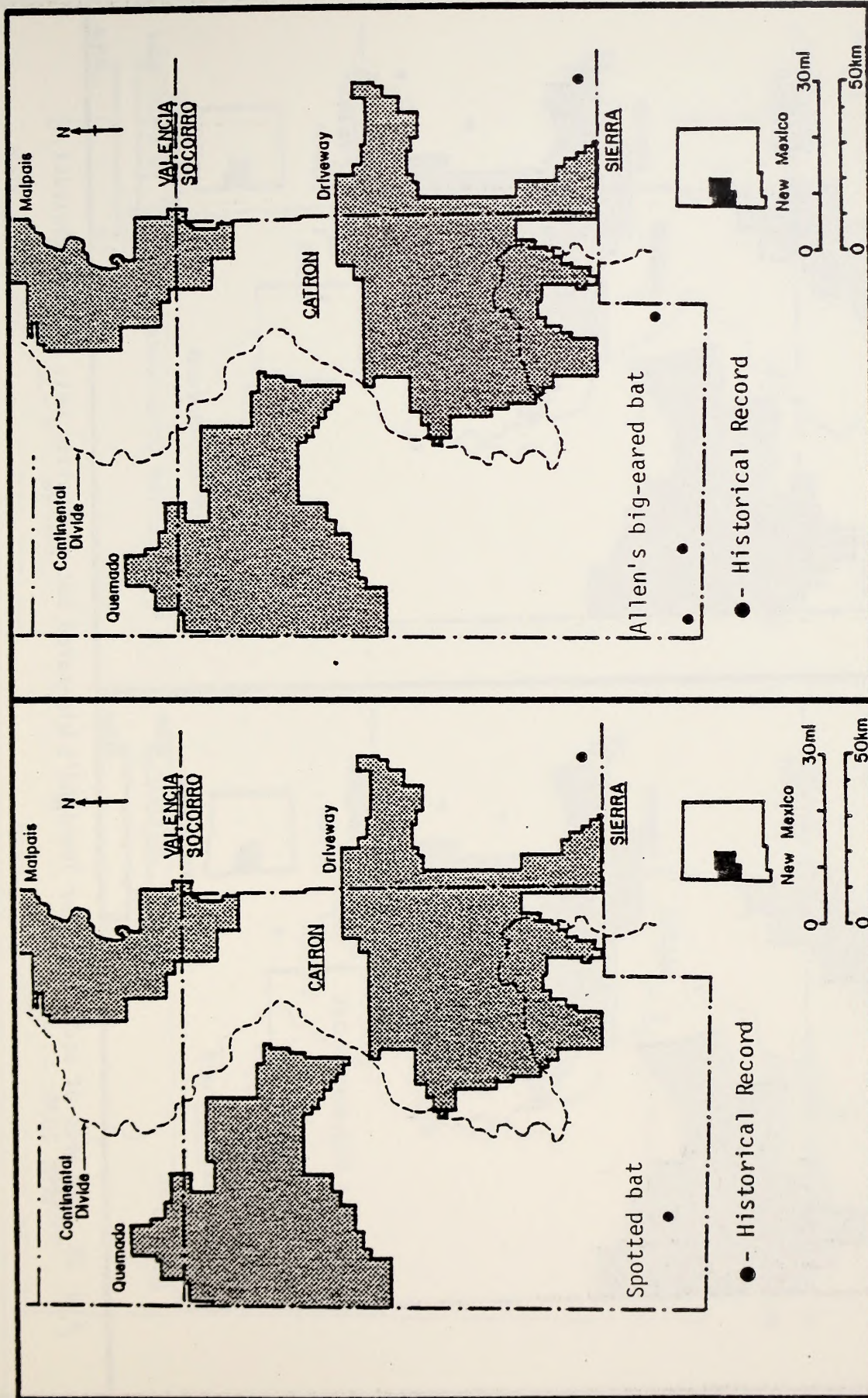


Fig. 24. Records of occurrence for spotted bat and Allen's big-eared bat, Socorro District, BLM, 1979.

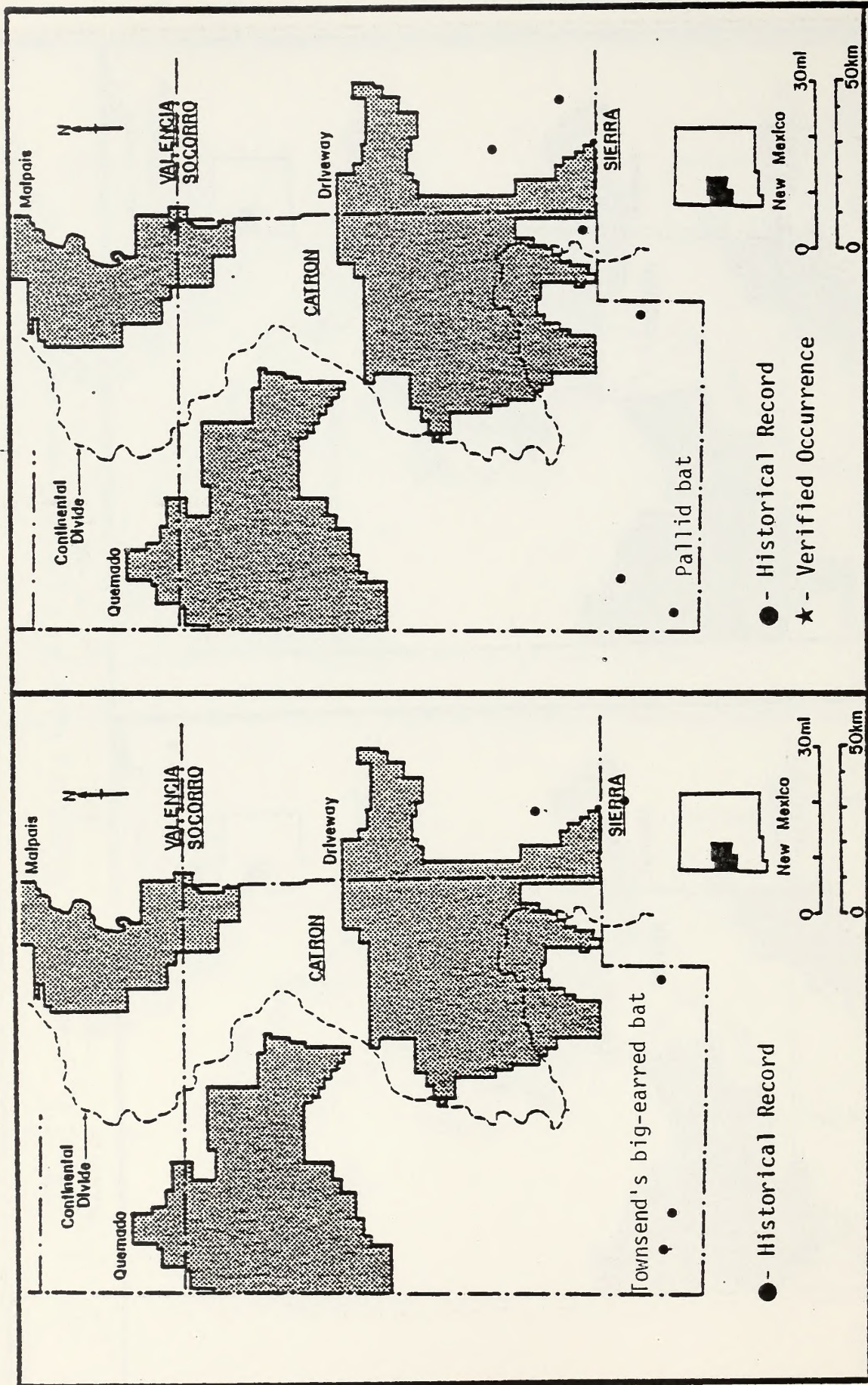


Fig. 25. Records of occurrence for Townsend's big-eared bat and pallid bat, Socorro District, BLM, 1979.

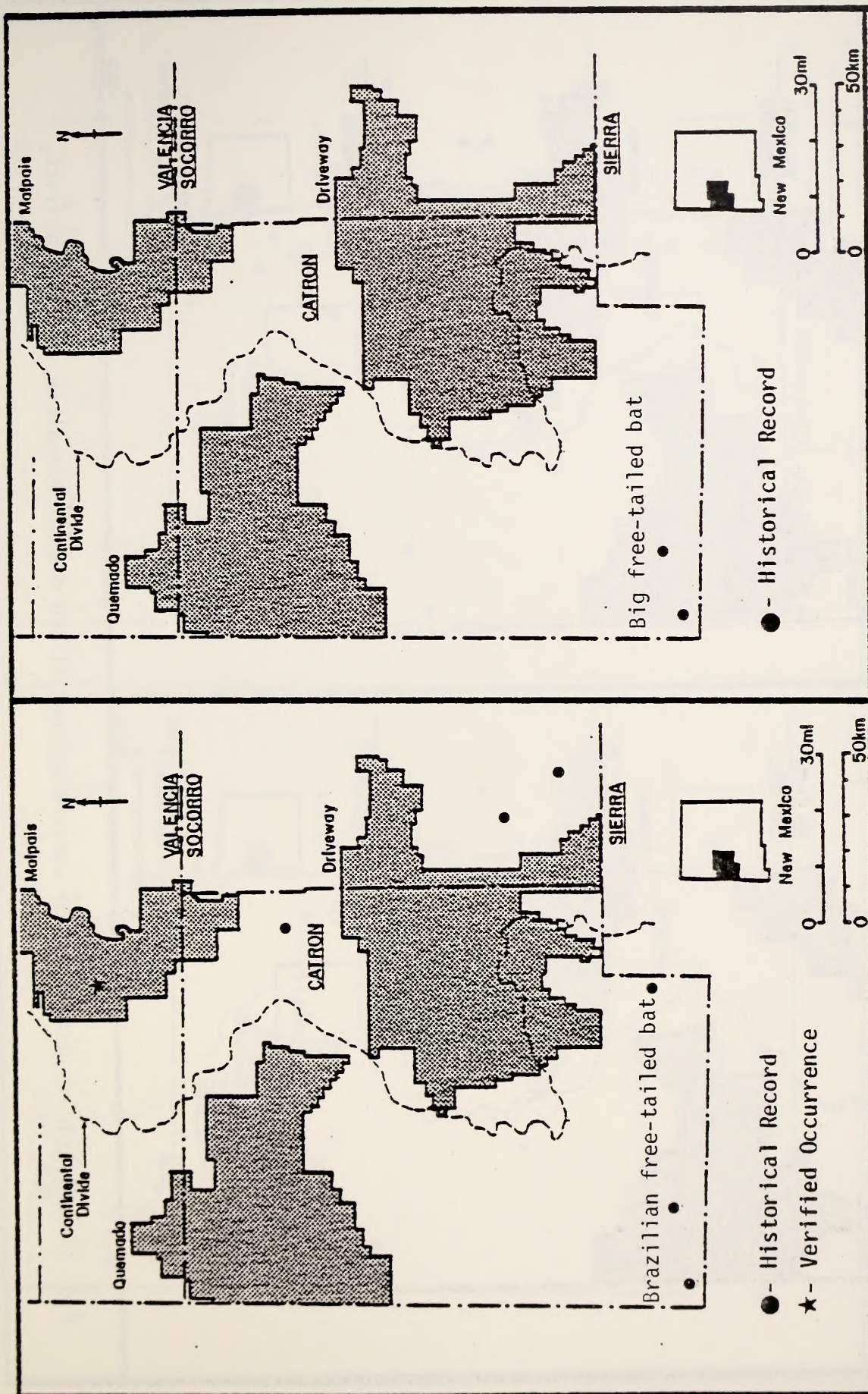


Fig. 26. Records of occurrence for Brazilian free-tailed bat and big free-tailed bat, Socorro District, BLM, 1979.

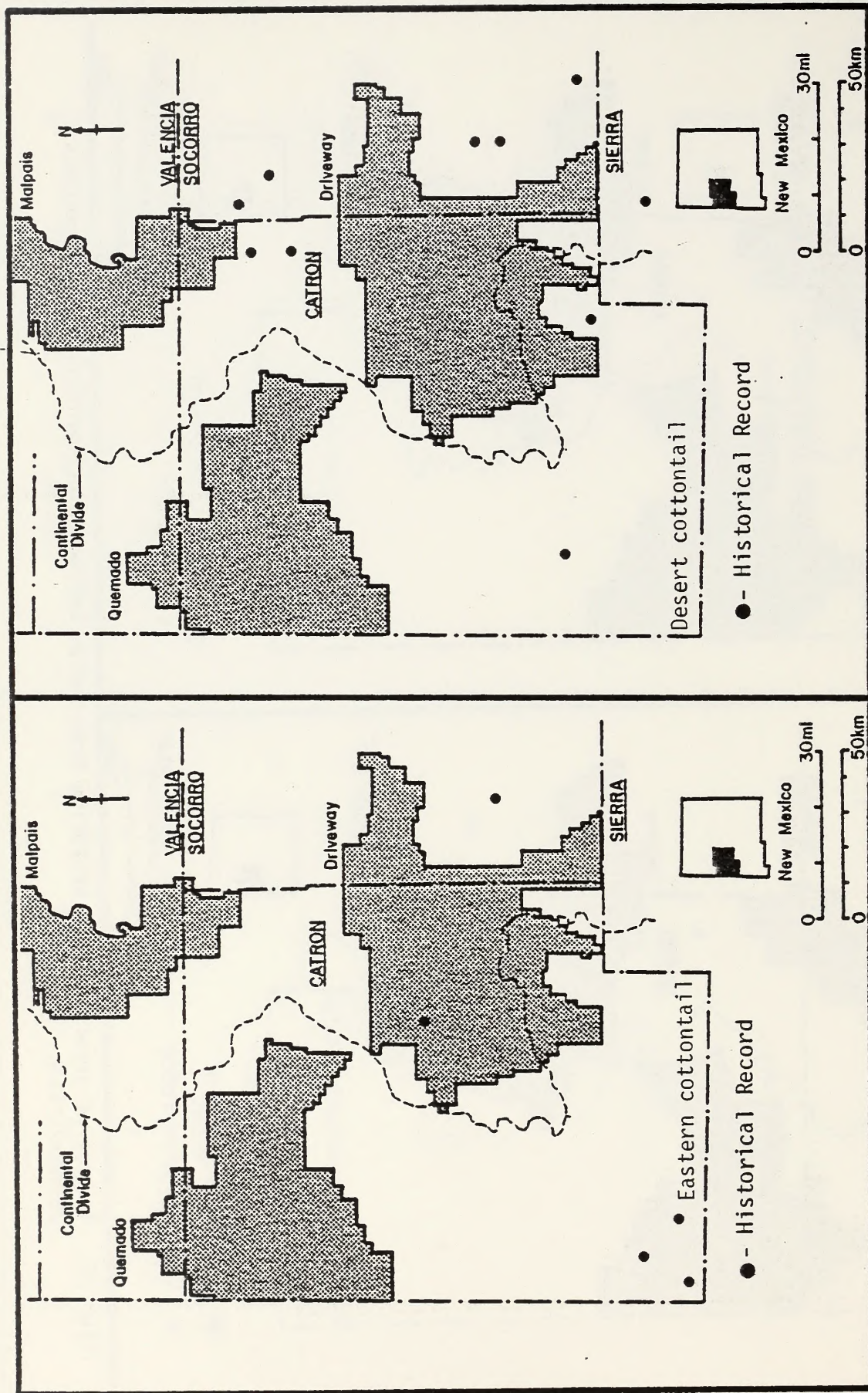


Fig. 27. Records of occurrence for eastern cottontail and desert cottontail, Socorro District, BLM, 1979.

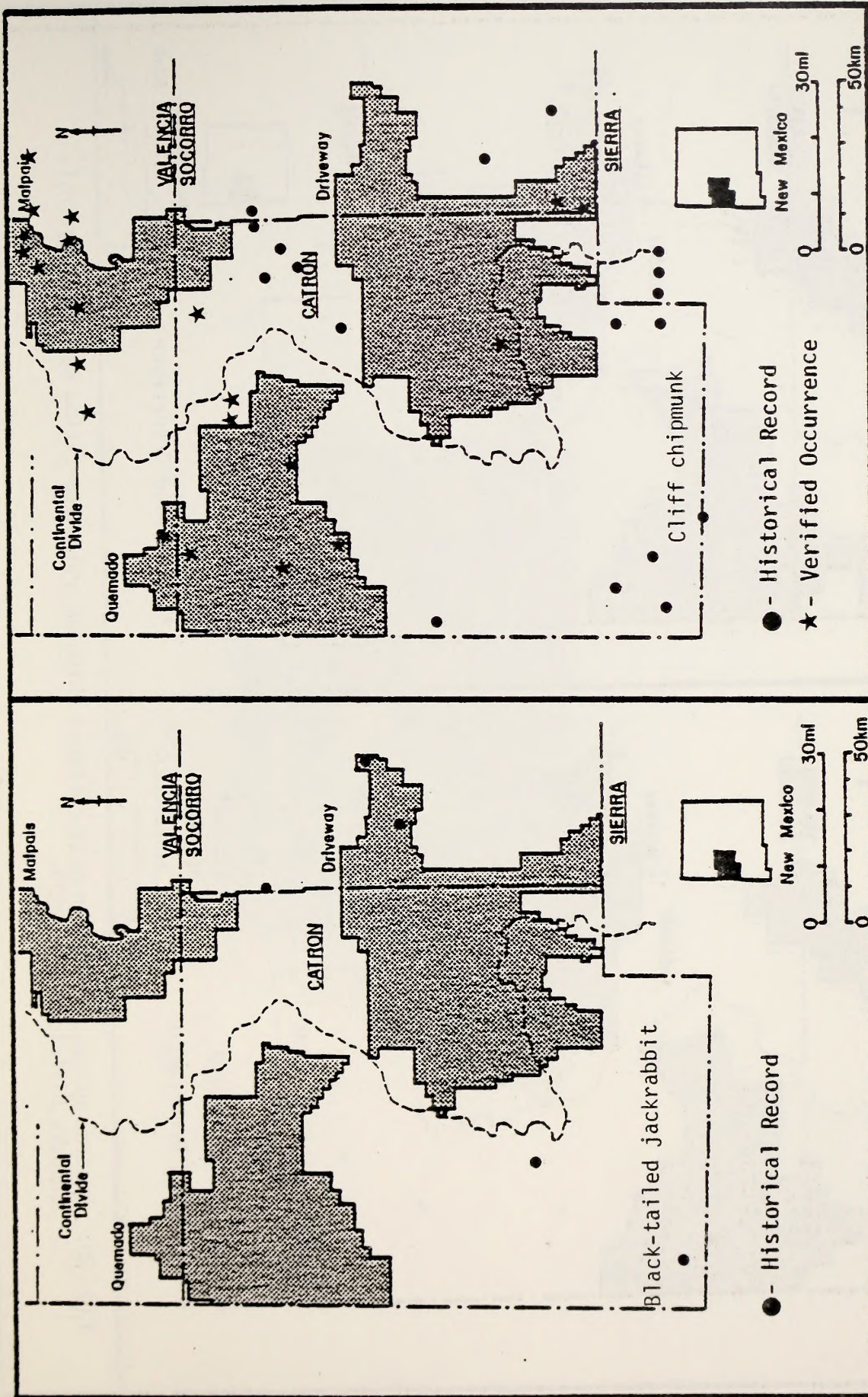


Fig. 28. Records of occurrence for black-tailed jackrabbit and cliff chipmunk, Socorro District, BLM, 1979.

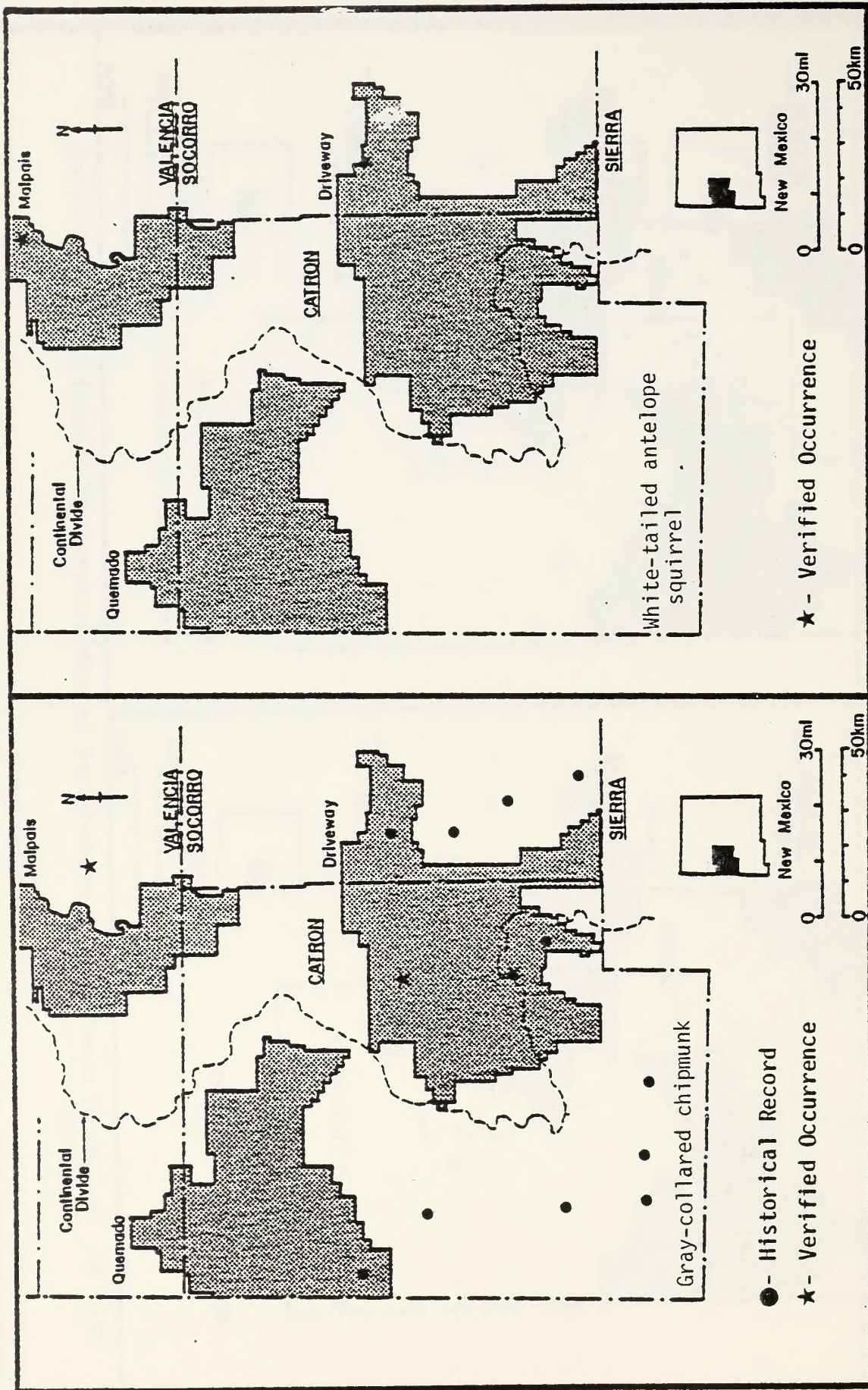


Fig. 29. Records of occurrence for gray-collared chipmunk and white-tailed antelope squirrel, Socorro District, BLM, 1979.

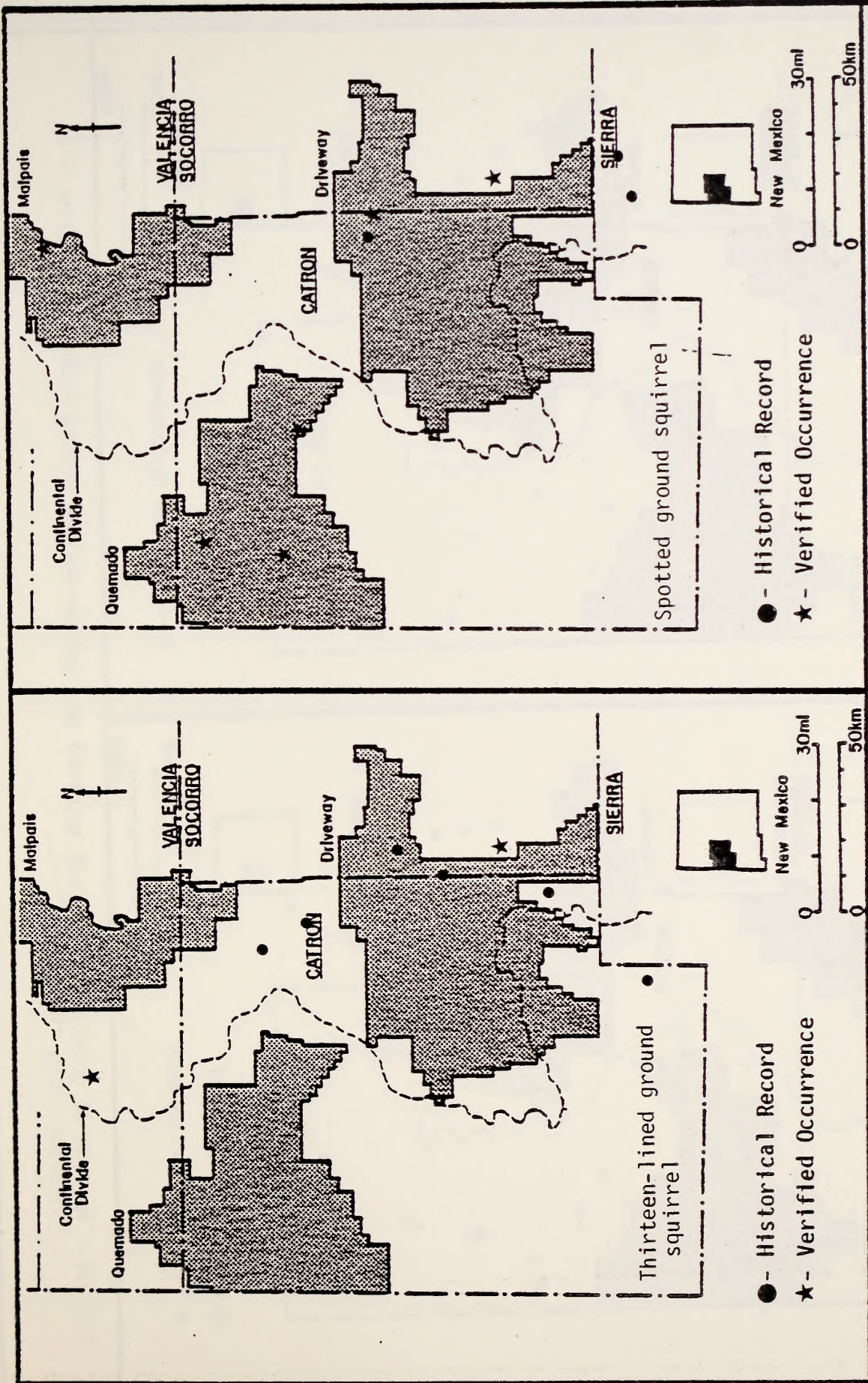


Fig. 30. Records of occurrence for thirteen-lined ground squirrel and spotted ground squirrel, Socorro District, BLM, 1979.

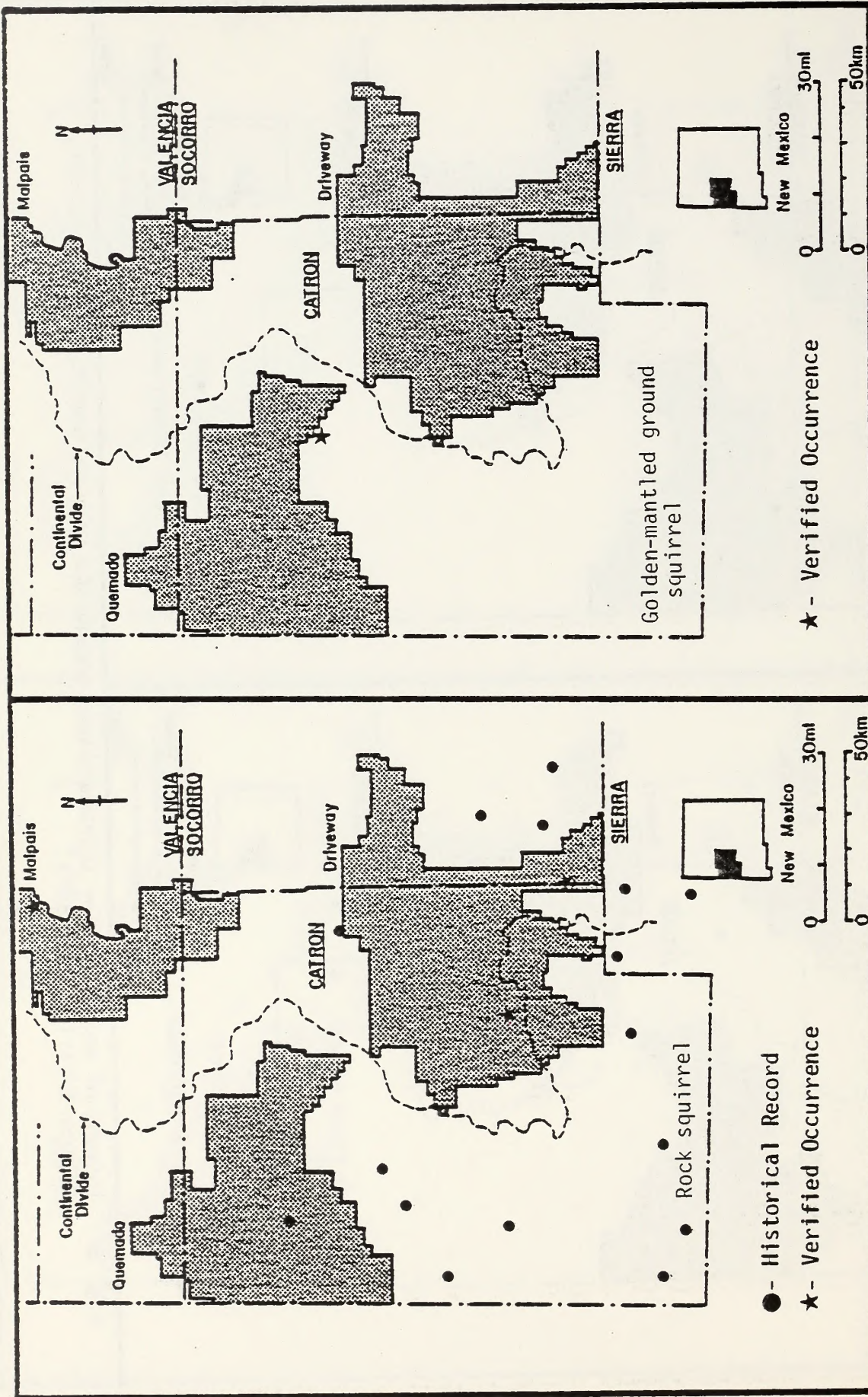


Fig. 31. Records of occurrence for rock squirrel and golden-mantled ground squirrel, Socorro District, BLM, 1979.

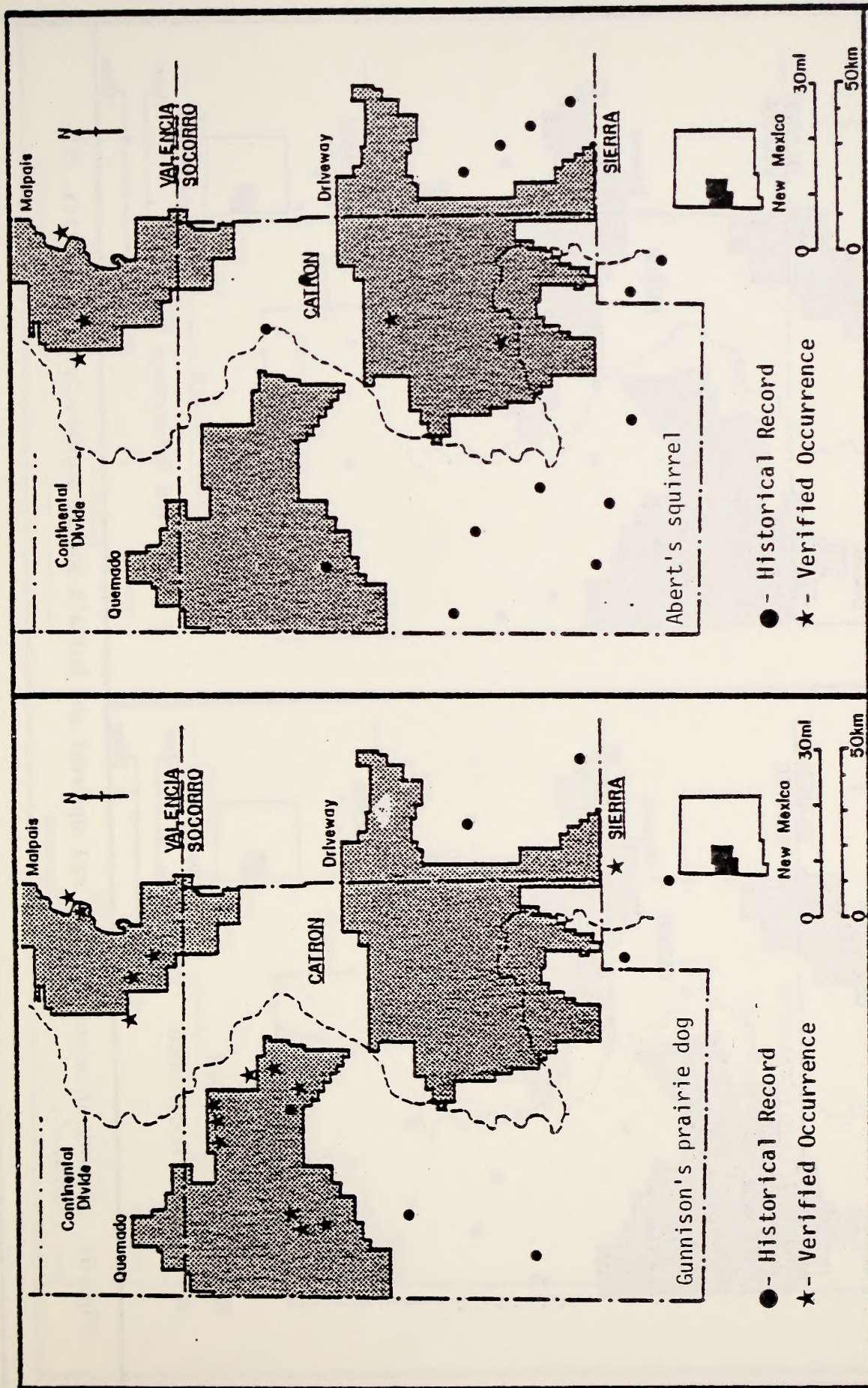


Fig. 32. Records of occurrence for Gunnison's prairie dog and Abert's squirrel, Socorro District, BLM, 1979.

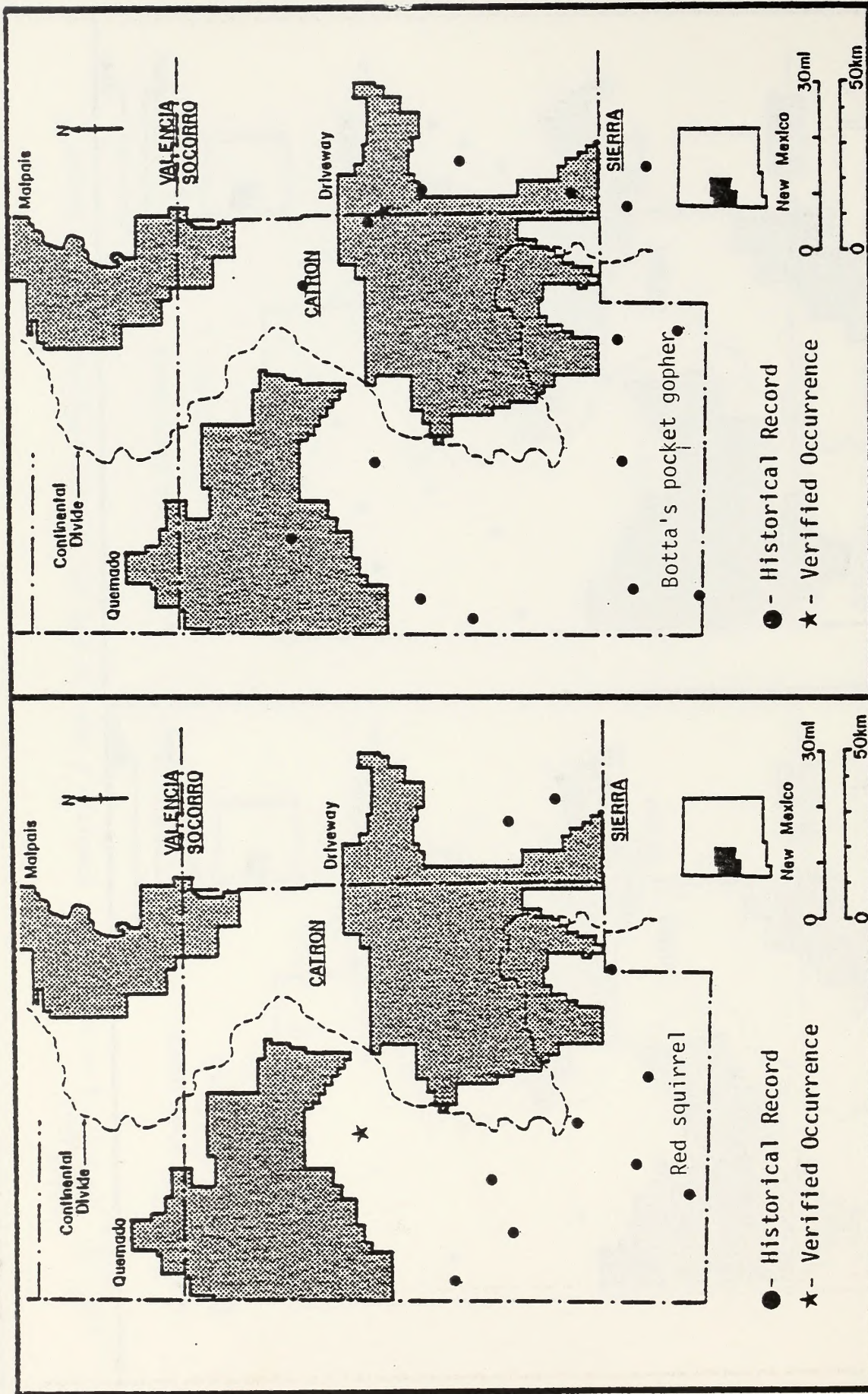


Fig. 33. Records of occurrence for red squirrel and Botta's pocket gopher, Socorro District, BLM, 1979.

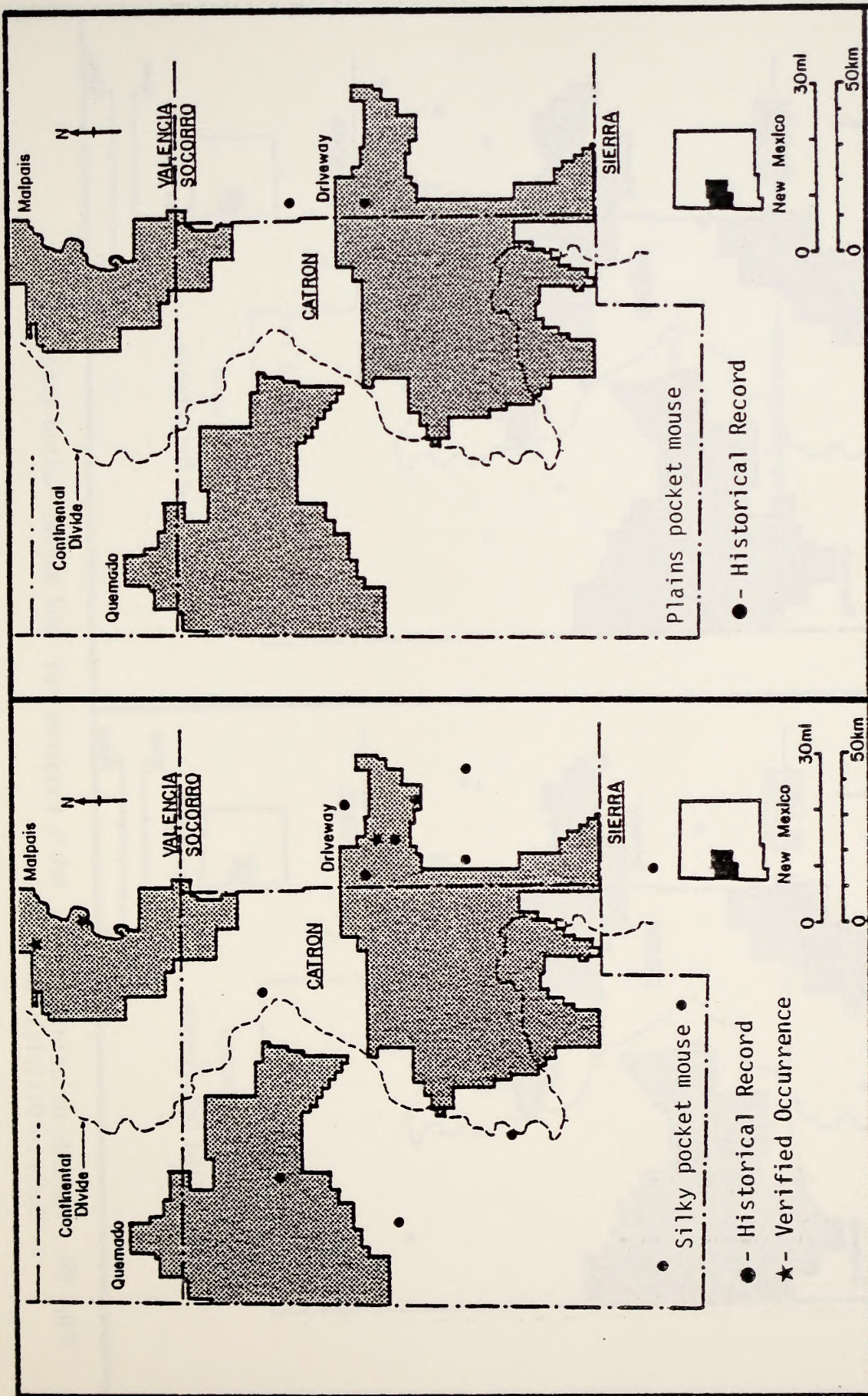


Fig. 34. Records of occurrence for silky pocket mouse and plains pocket mouse, Socorro District, BLM, 1979.

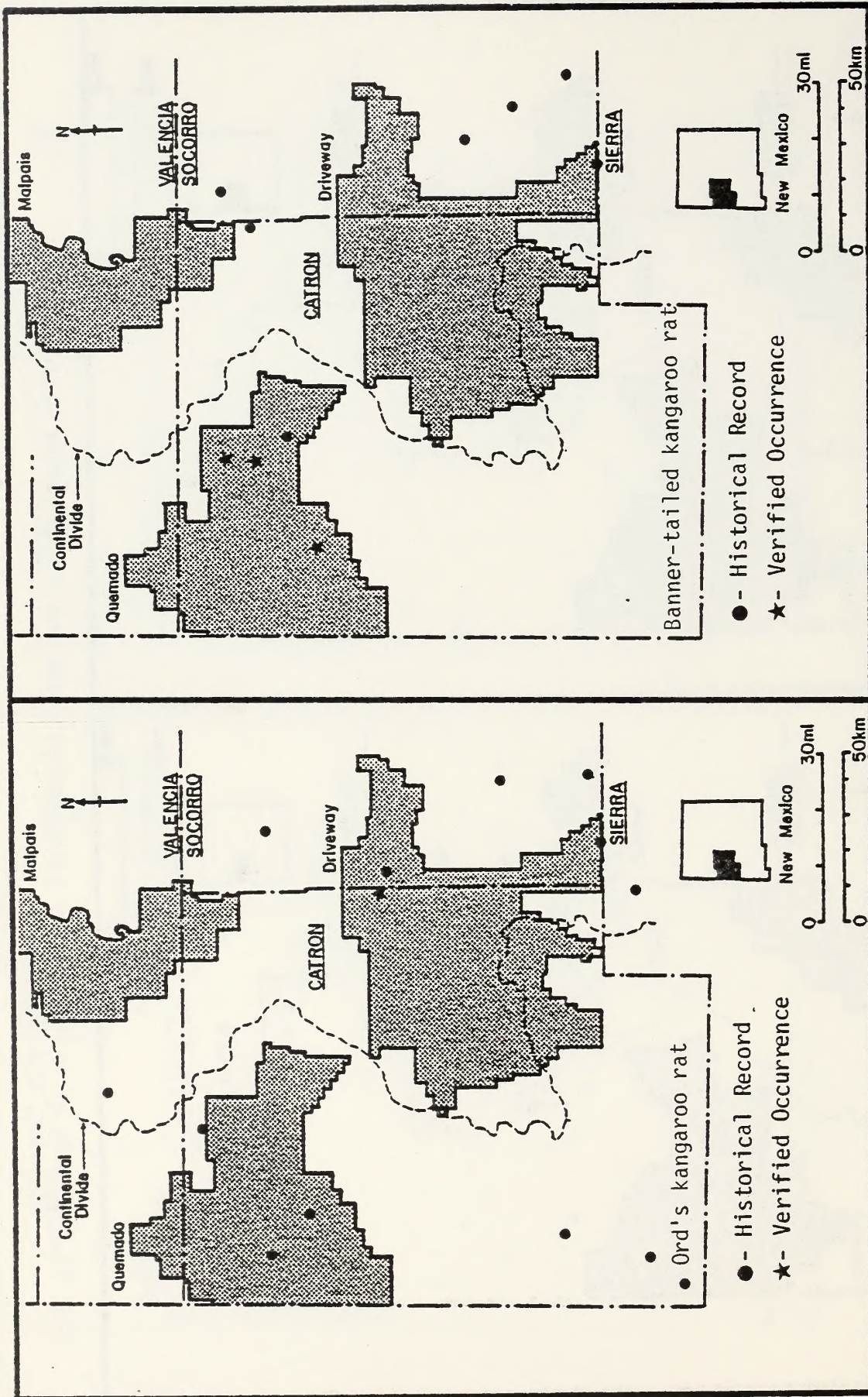


Fig. 35. Records of occurrence for Ord's kangaroo rat and banner-tailed kangaroo rat, Socorro District, BLM, 1979.

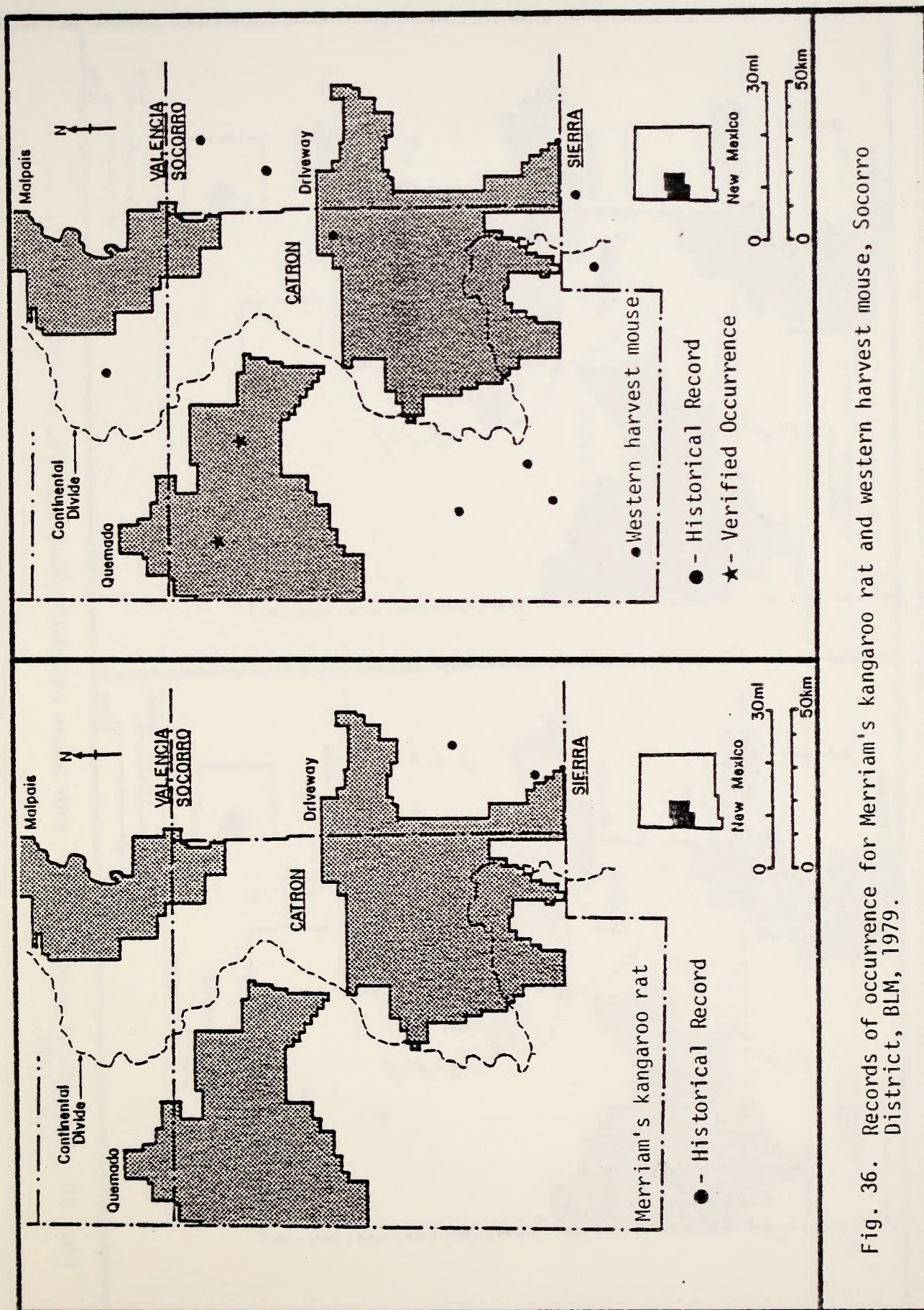


Fig. 36. Records of occurrence for Merriam's kangaroo rat and western harvest mouse, Socorro District, BLM, 1979.

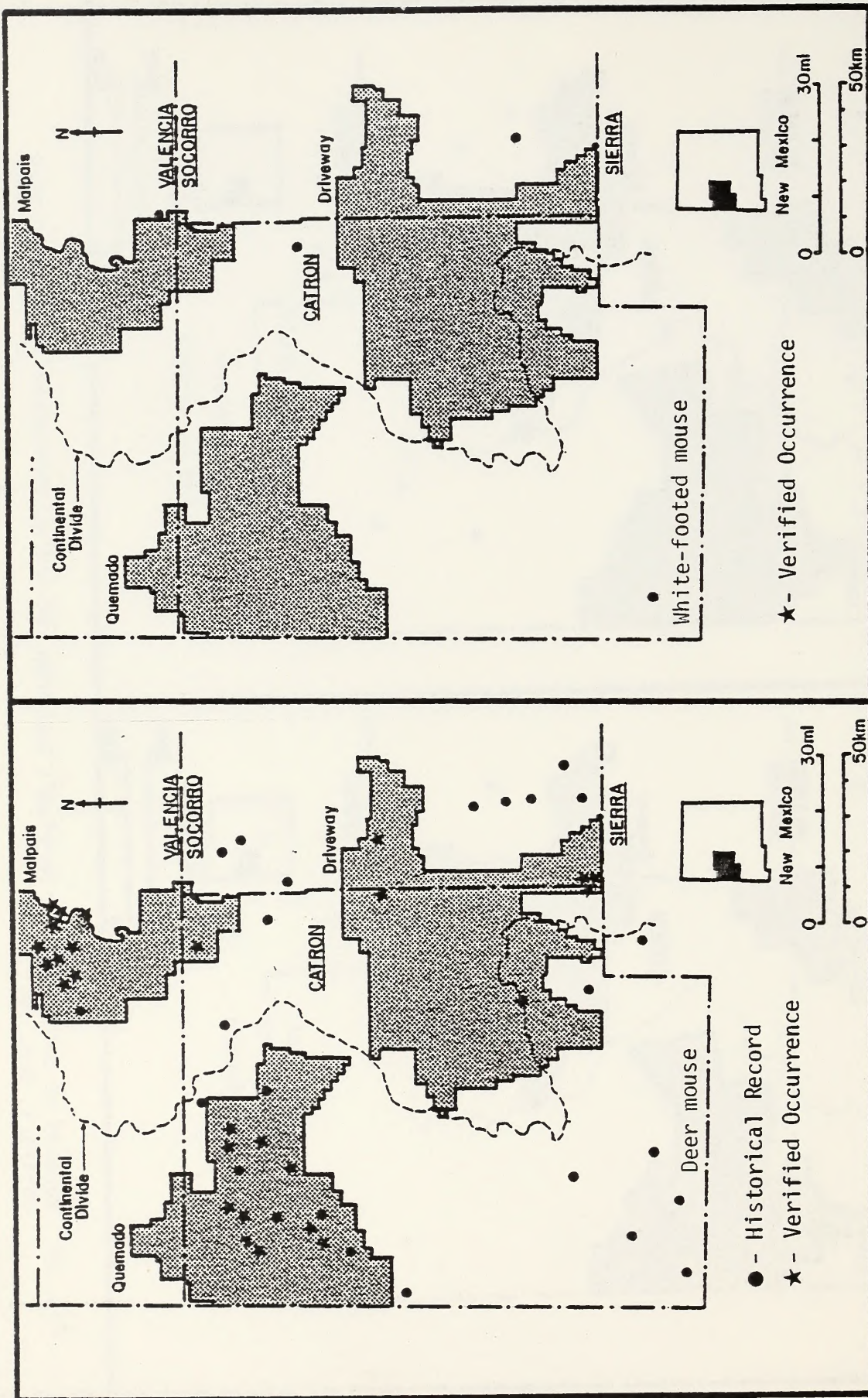


Fig. 37. Records of occurrence for deer mouse and white-footed mouse, Socorro District, BLM, 1979.

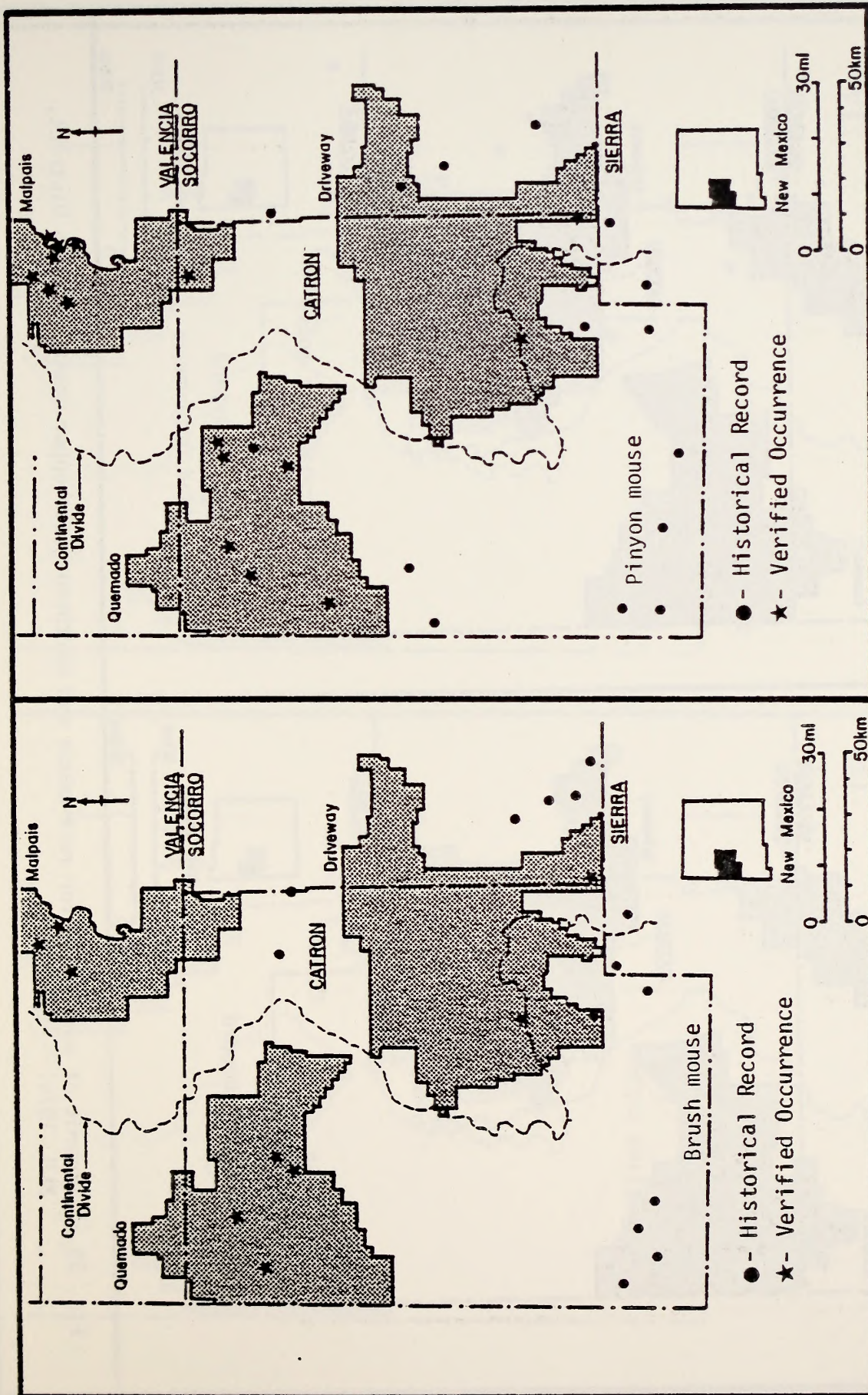


Fig. 38. Records of occurrence for brush mouse and pinyon mouse, Socorro District, BLM, 1979.

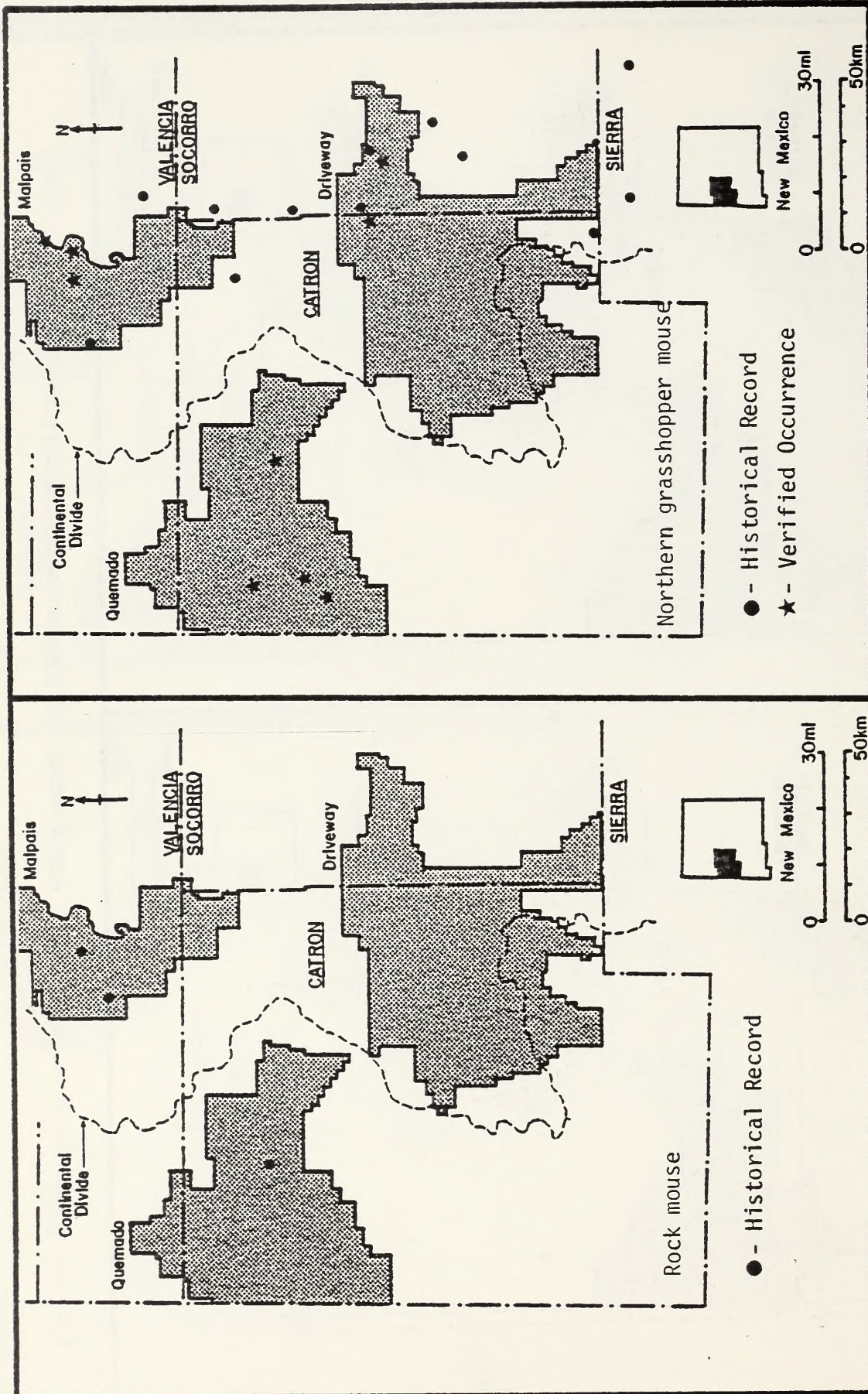


Fig. 39. Records of occurrence for rock mouse and northern grasshopper mouse, Socorro District, BLM, 1979.

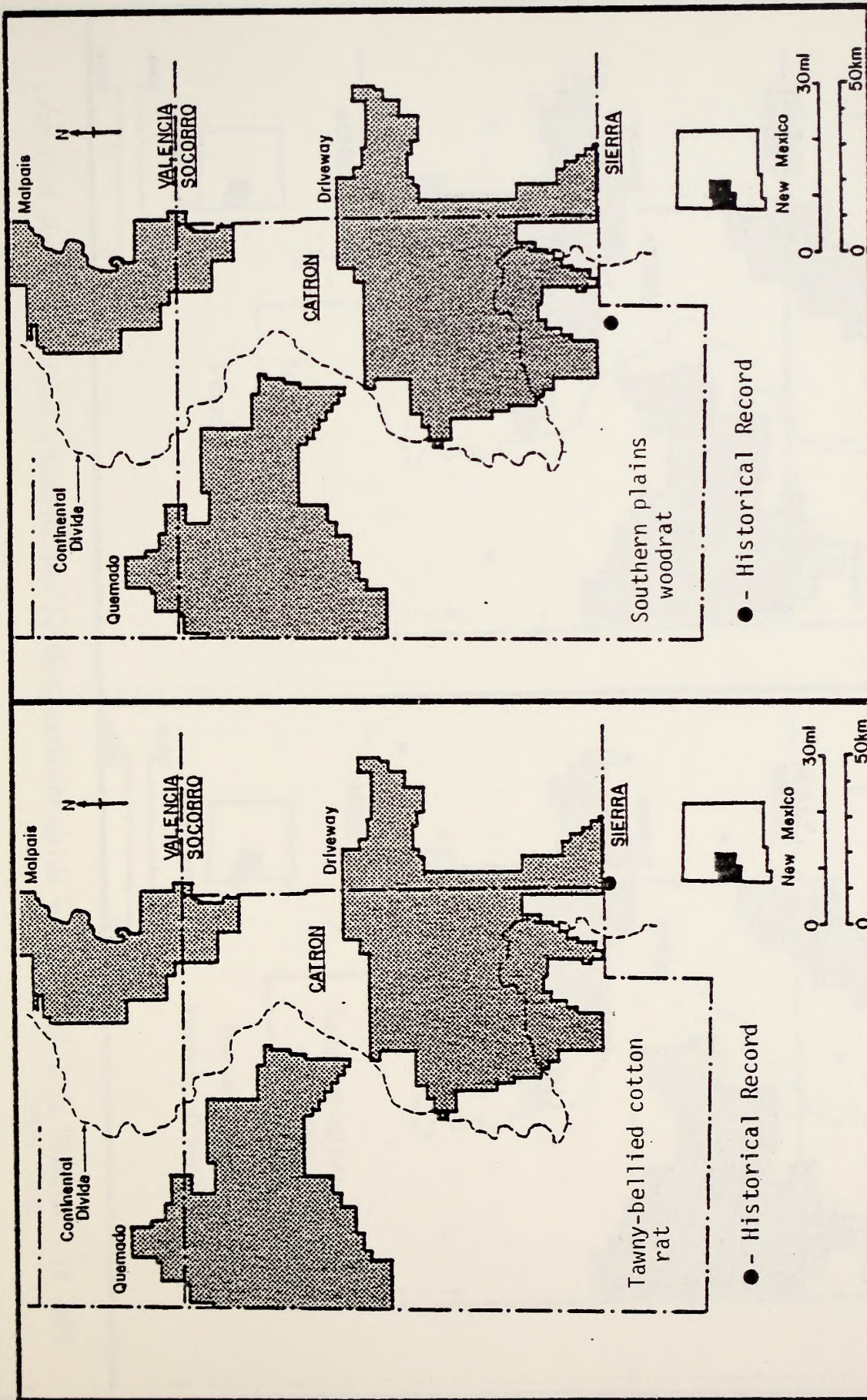


Fig. 40. Records of occurrence for tawny-bellied cotton rat and southern plains woodrat, Socorro District, BLM, 1979.

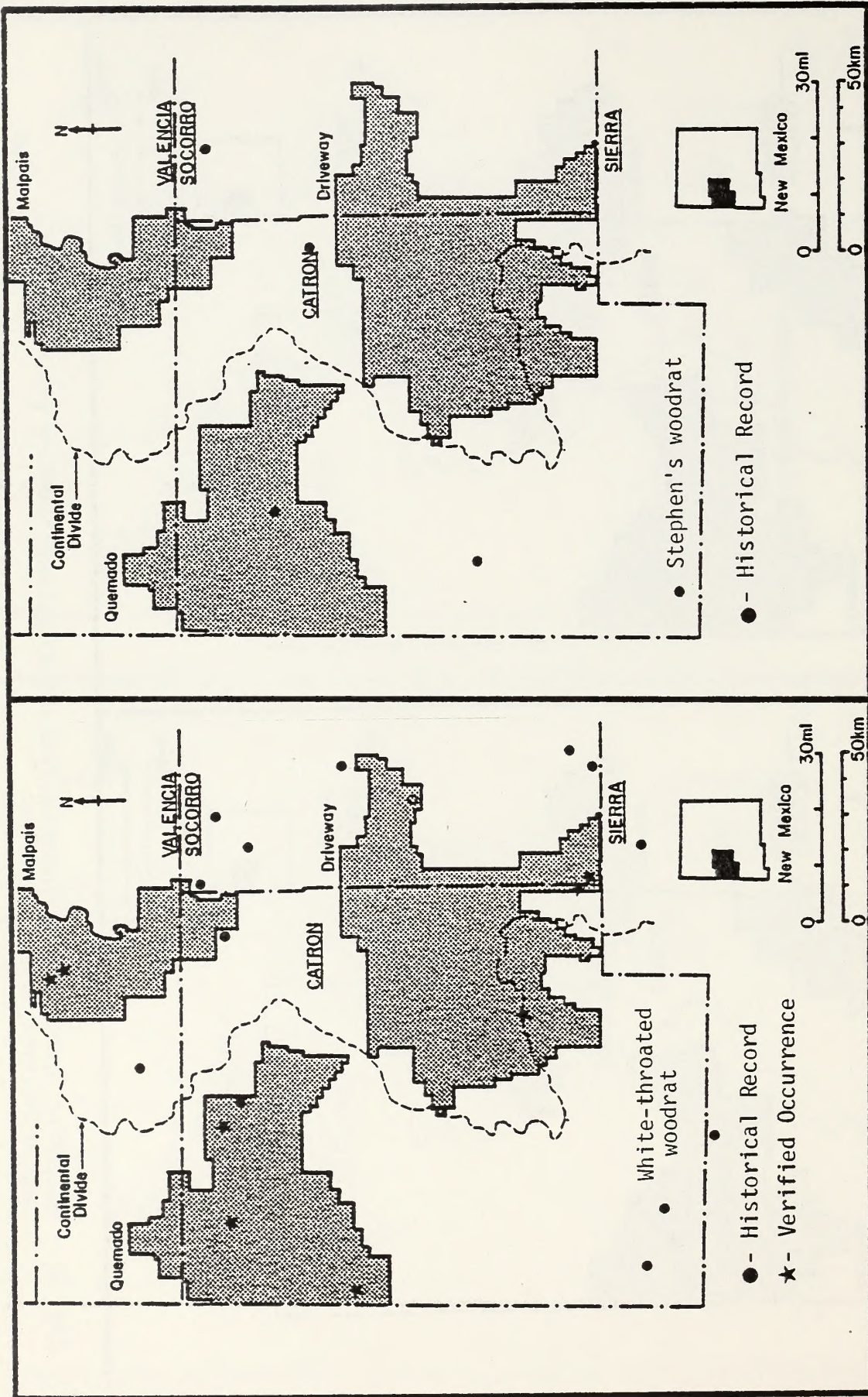


Fig. 41. Records of occurrence for white-throated woodrat and Stephen's woodrat, Socorro District, BLM, 1979.

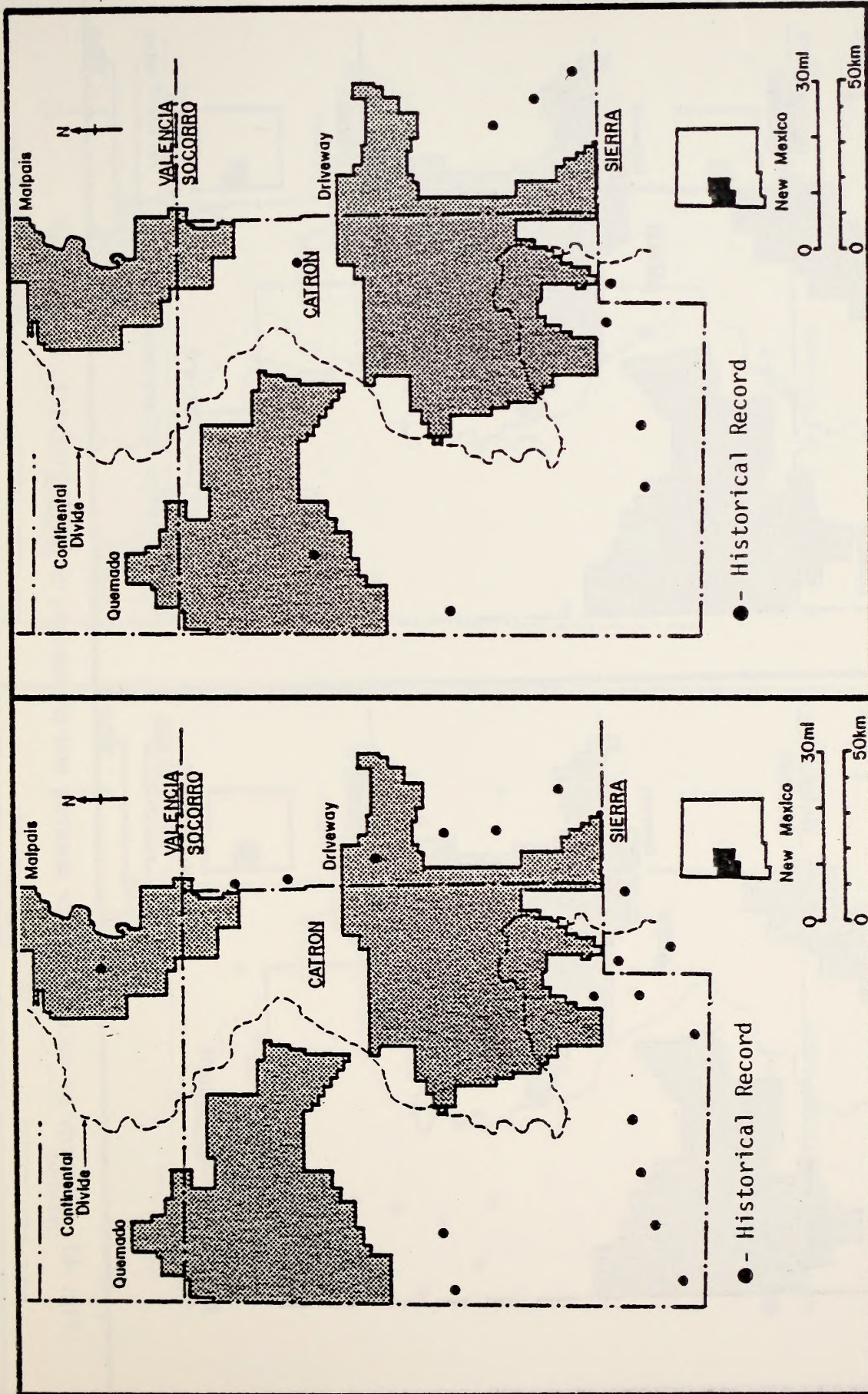


Fig. 42. Records of occurrence for Mexican woodrat and Mexican vole, Socorro District, BLM, 1979.

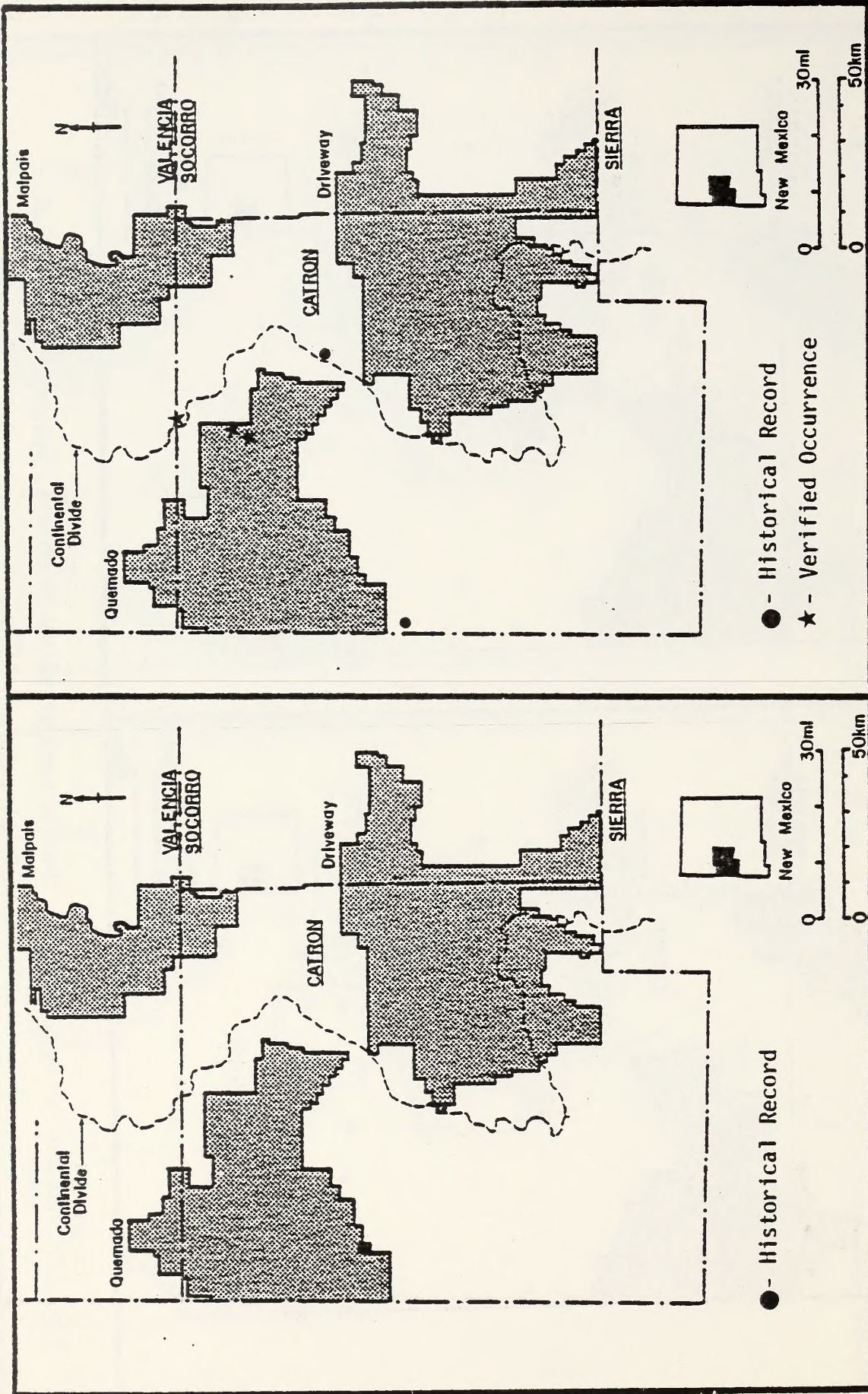


Fig. 43. Records of occurrence for muskrat and porcupine, Socorro District, BLM, 1979.

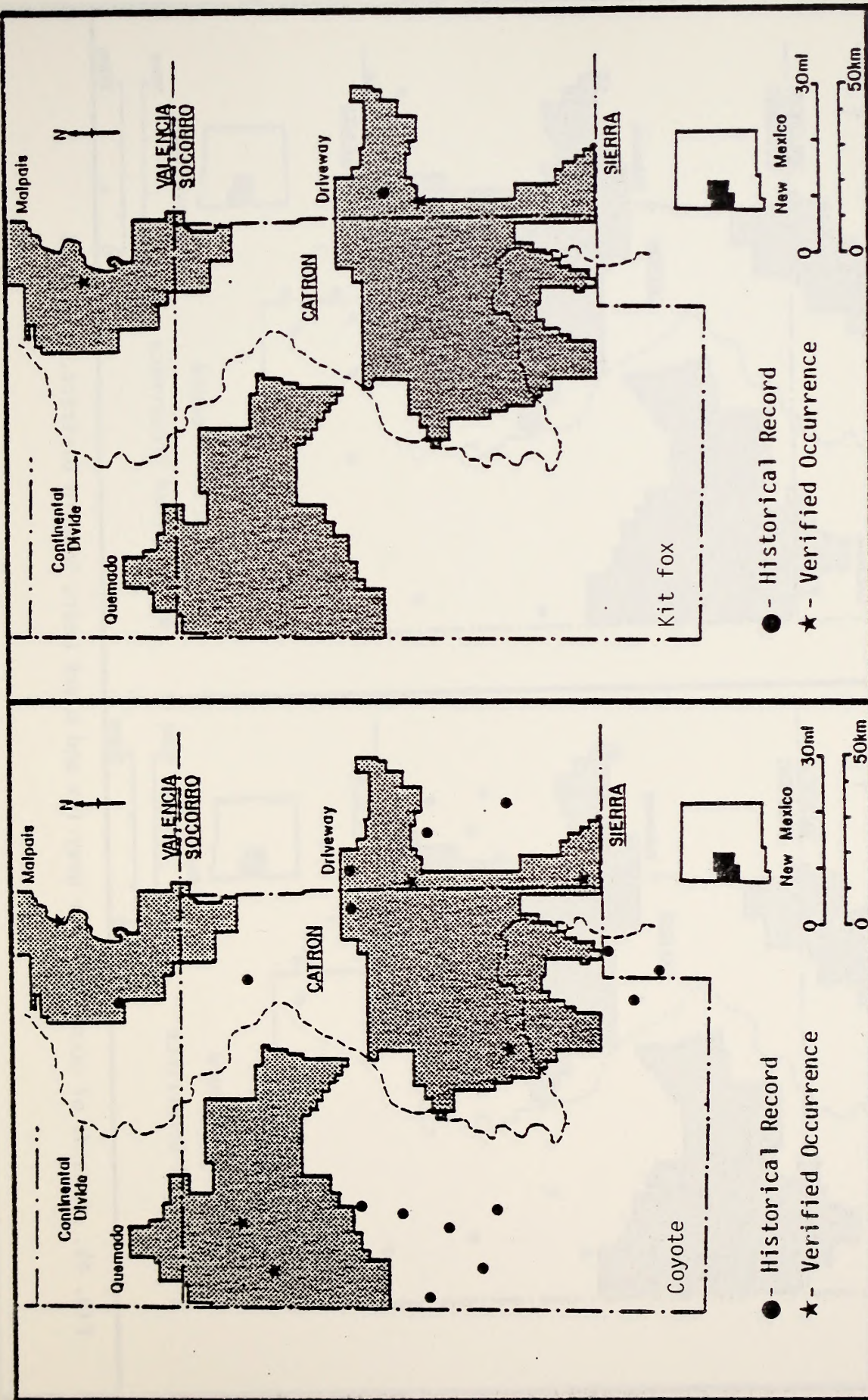


Fig. 44. Records of occurrence for coyote and kit fox, Socorro District, BLM, 1979.

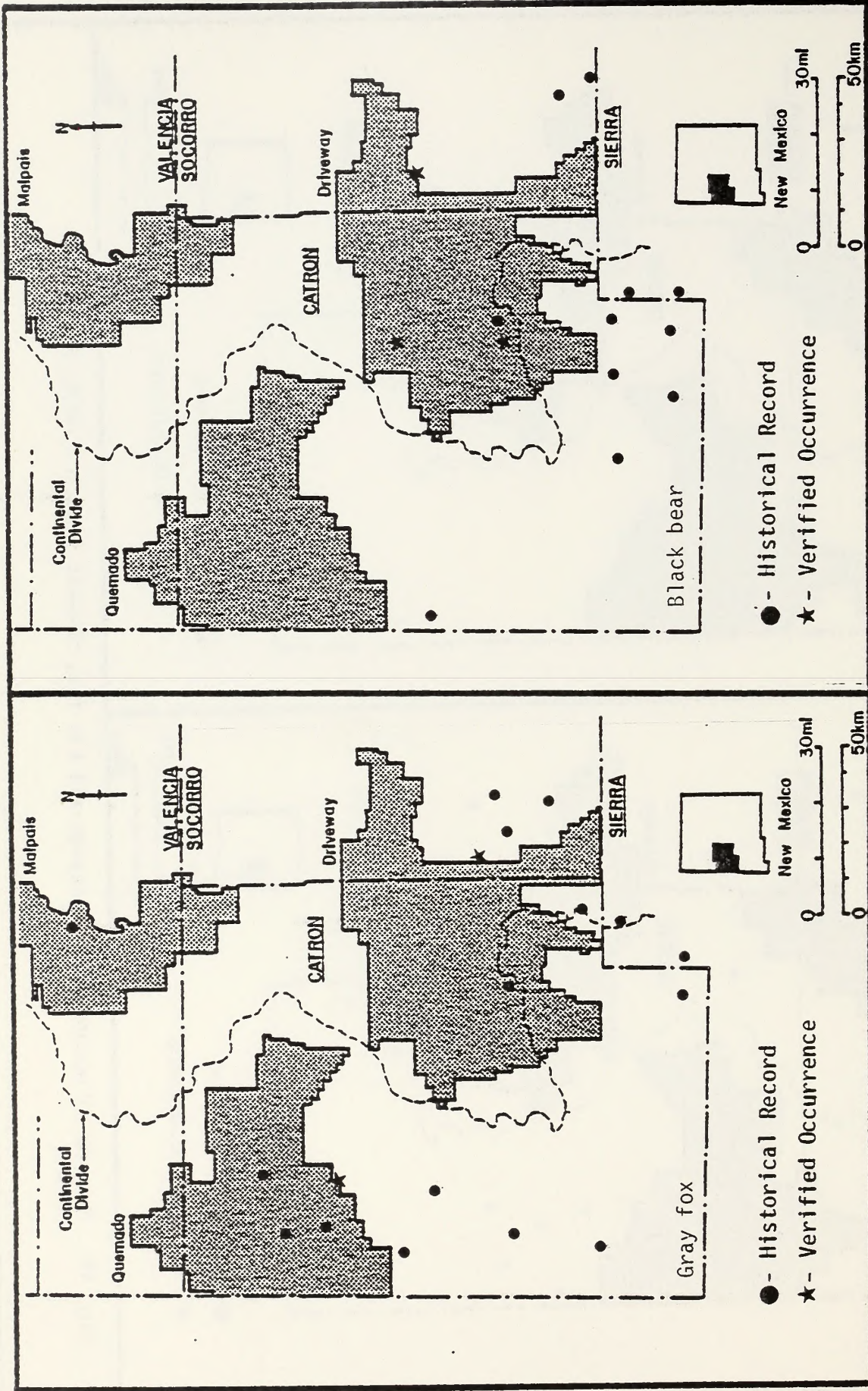


Fig. 45. Records of occurrence for gray fox and black bear, Socorro District, BLM, 1979.

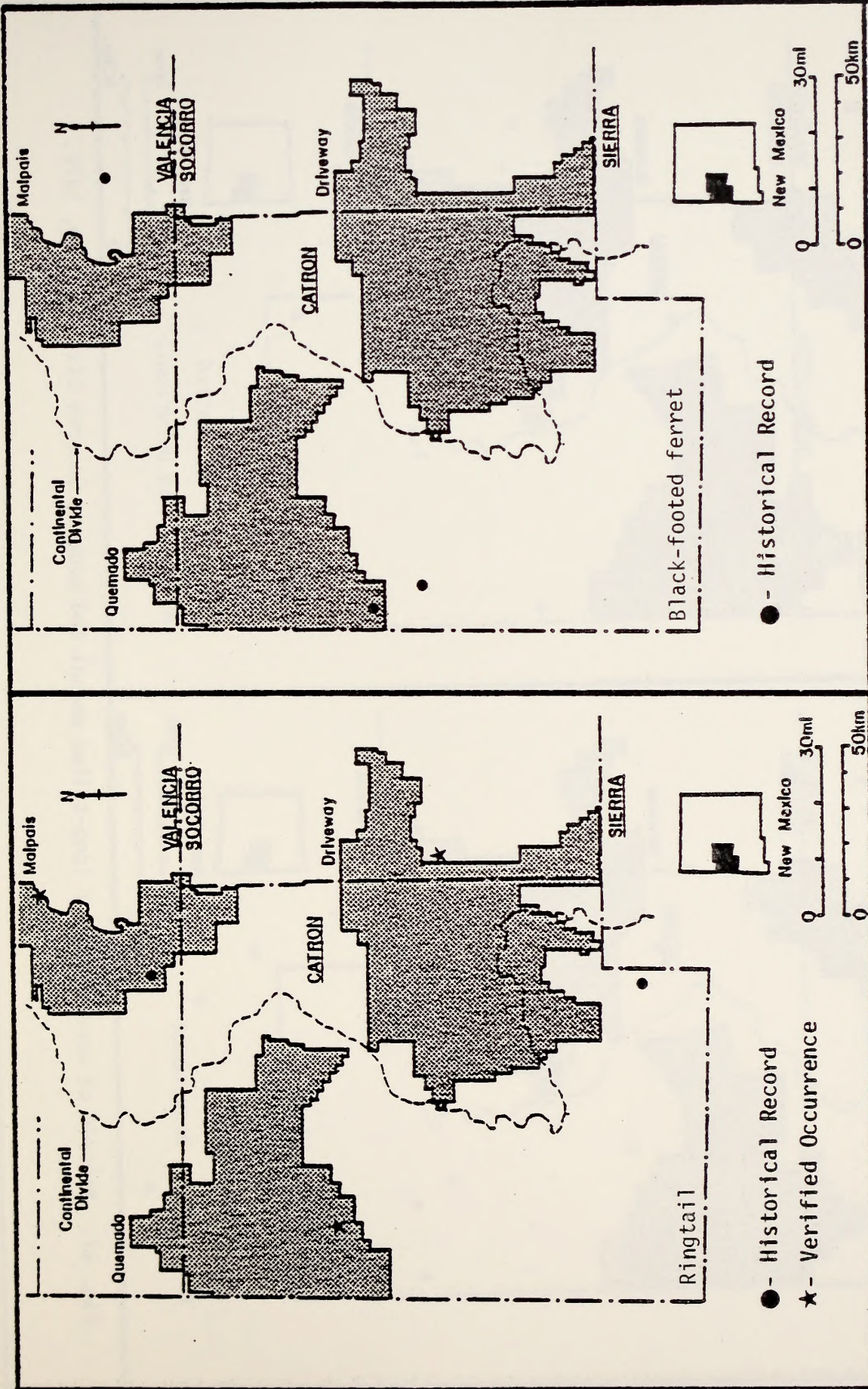


Fig. 46. Records of occurrence for ringtail and black-footed ferret, Socorro District, BLM, 1979.

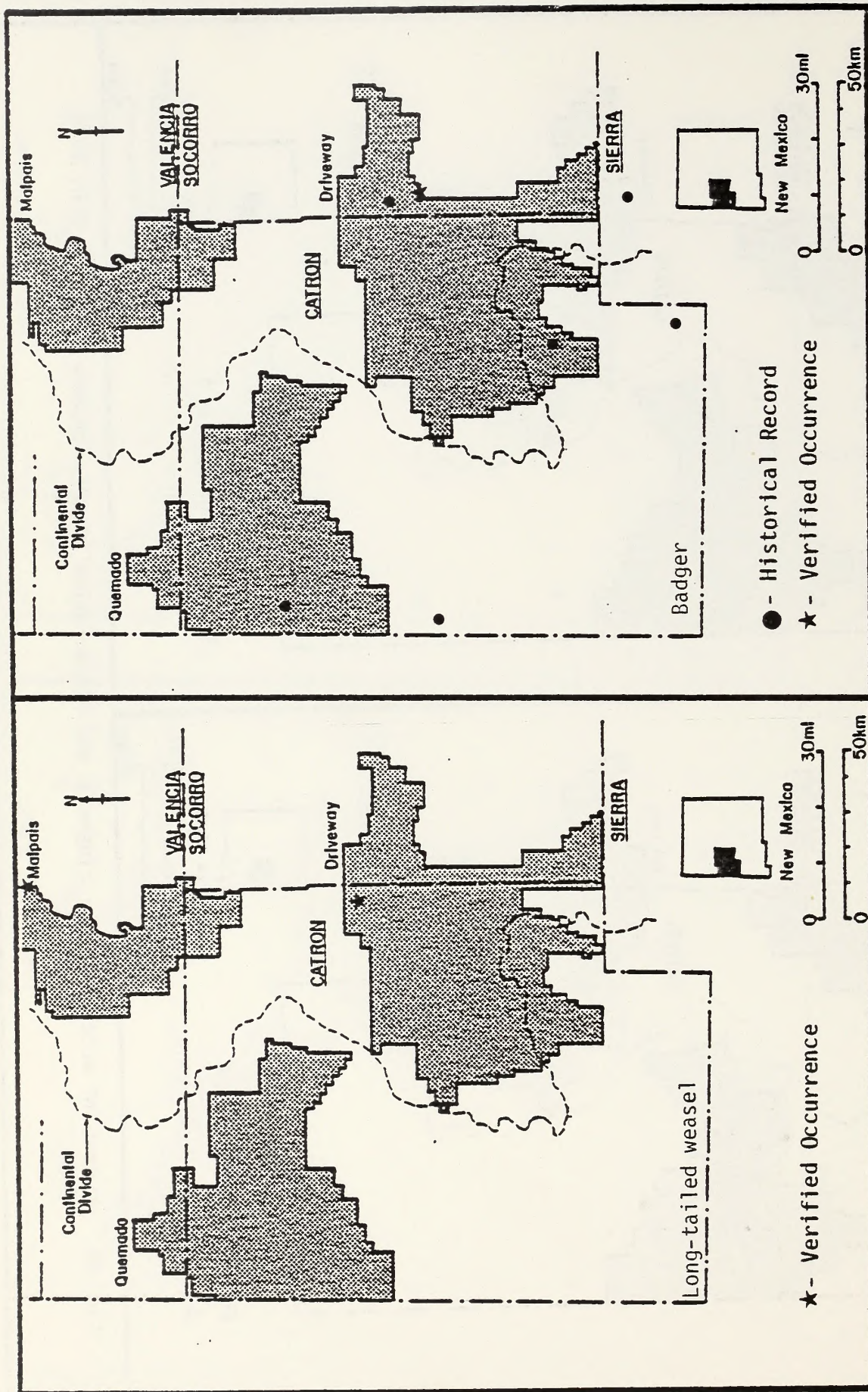


Fig. 47. Records of occurrence for long-tailed weasel and badger, Socorro District, BLM, 1979.

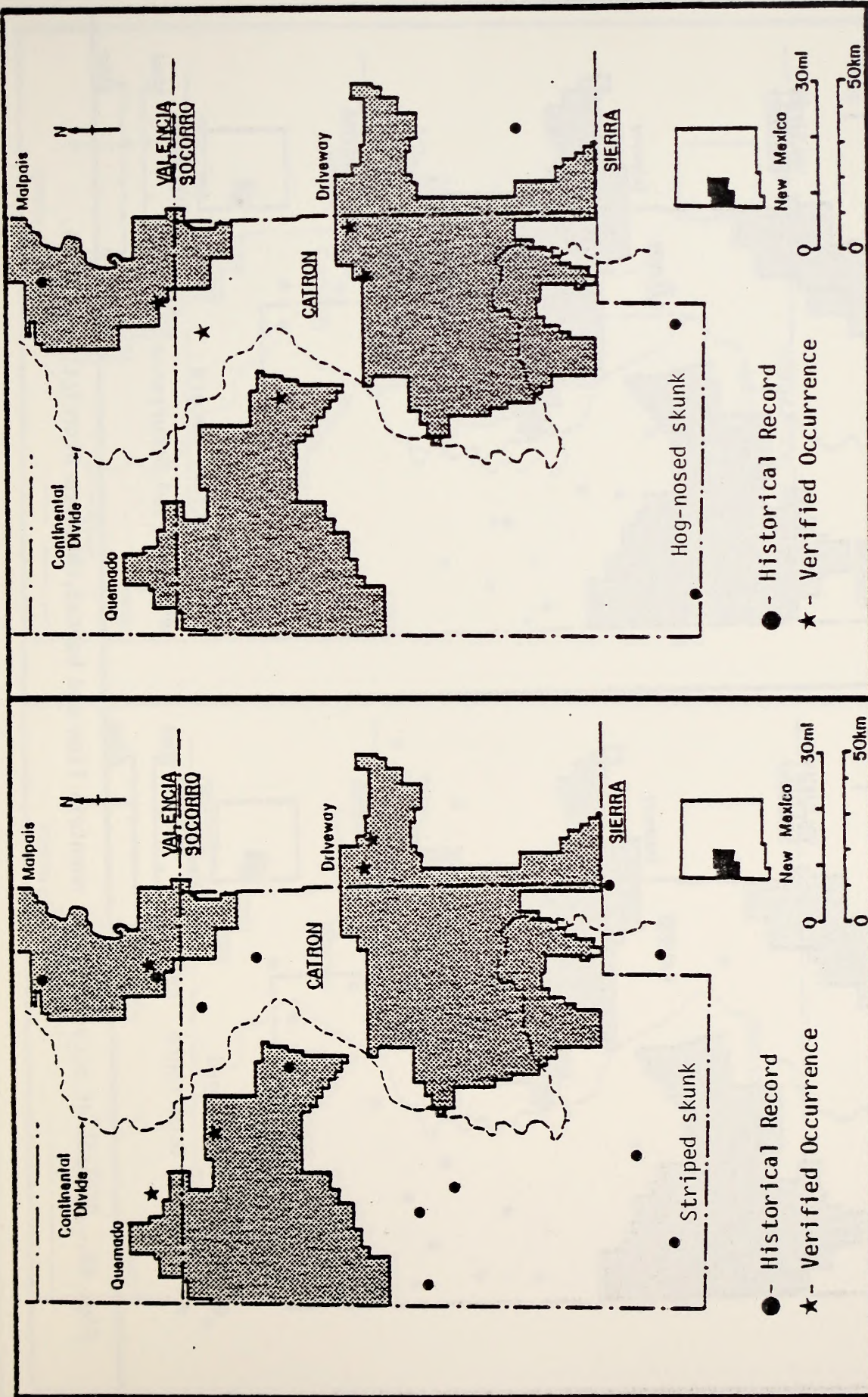


Fig. 48. Records of occurrence for striped skunk and hog-nosed skunk, Socorro District, BLM, 1979.

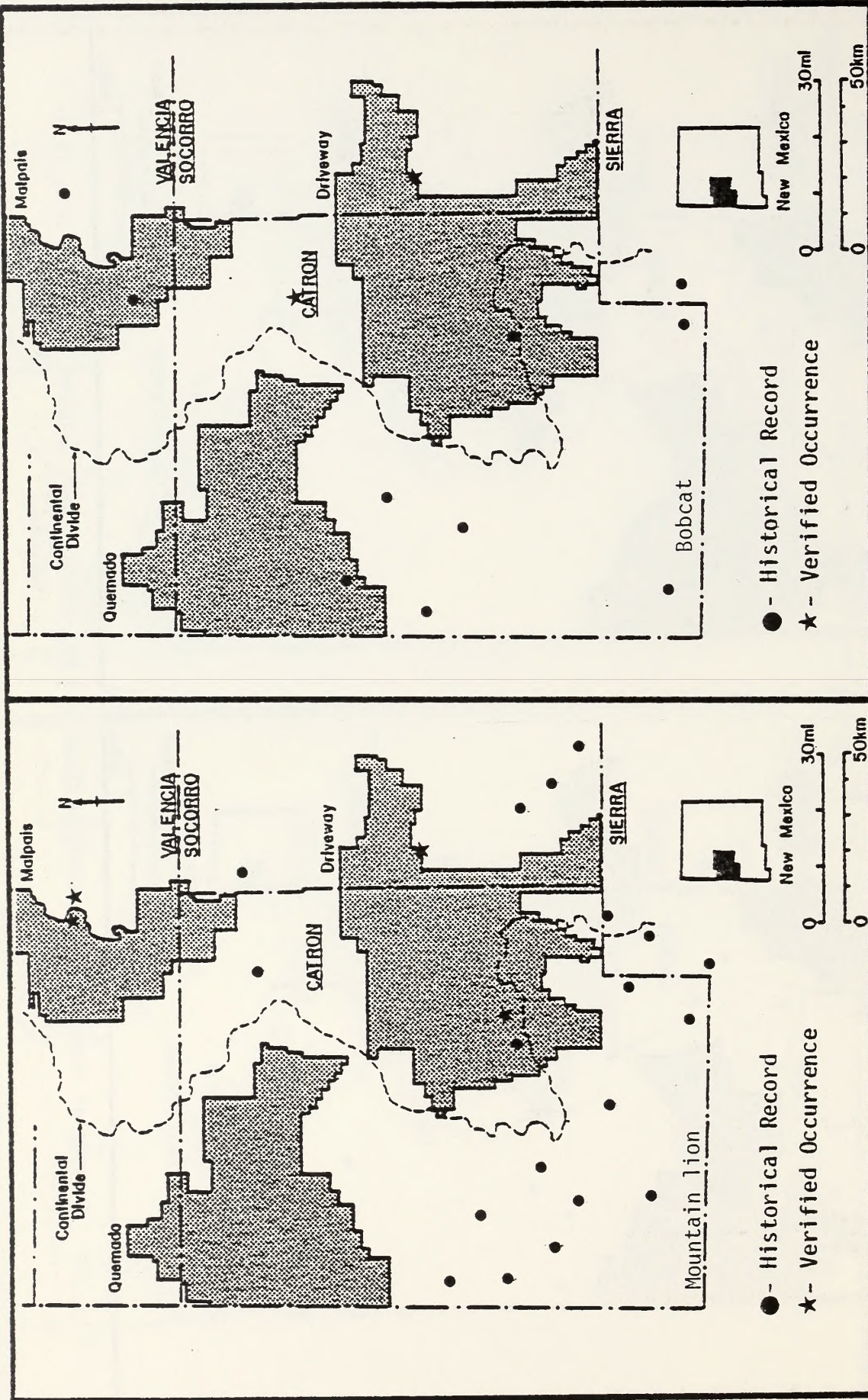


Fig. 49. Records of occurrence for mountain lion and bobcat, Socorro District, BLM, 1979.

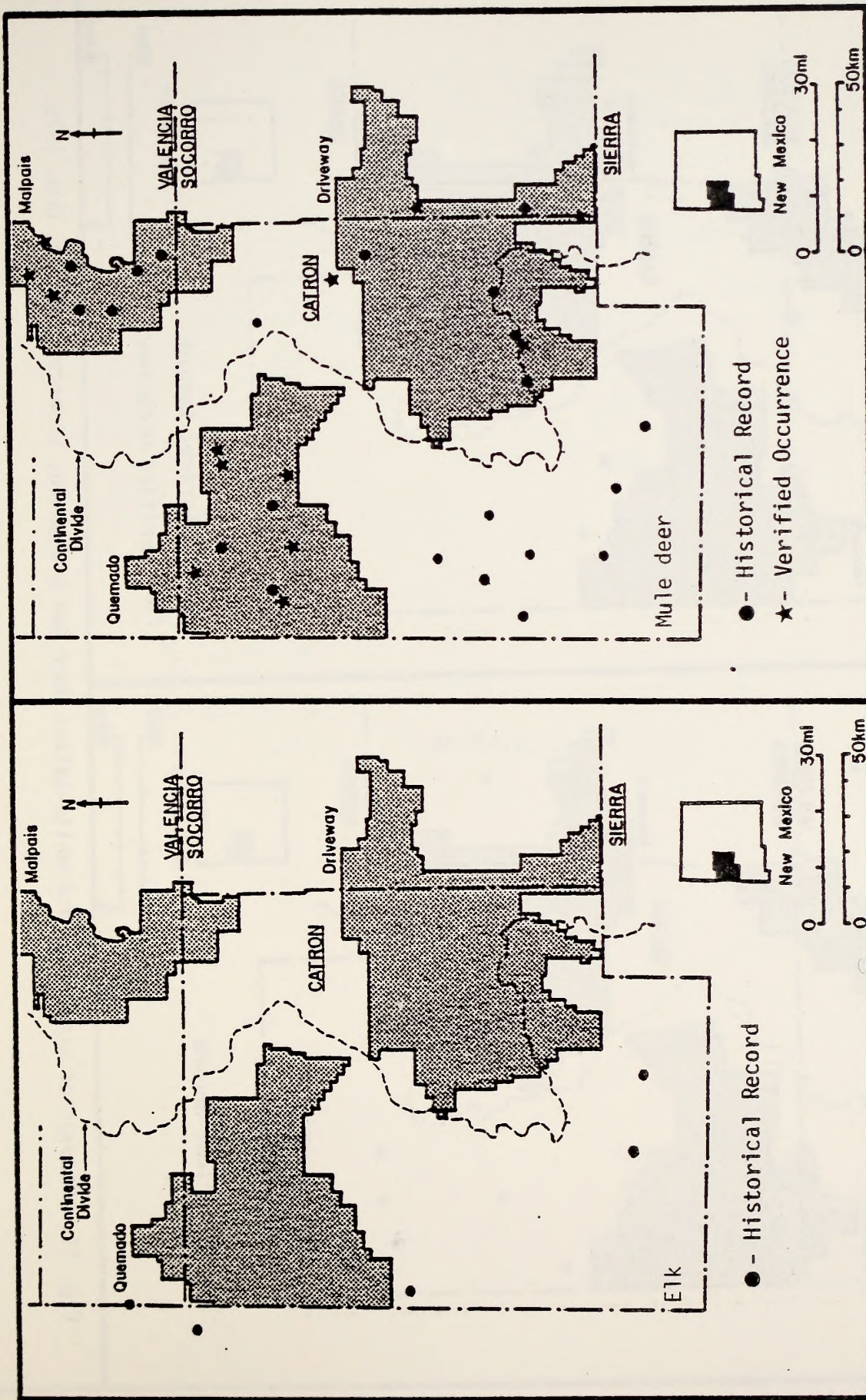


Fig. 50. Records of occurrence for elk and mule deer, Socorro District, BLM, 1979.

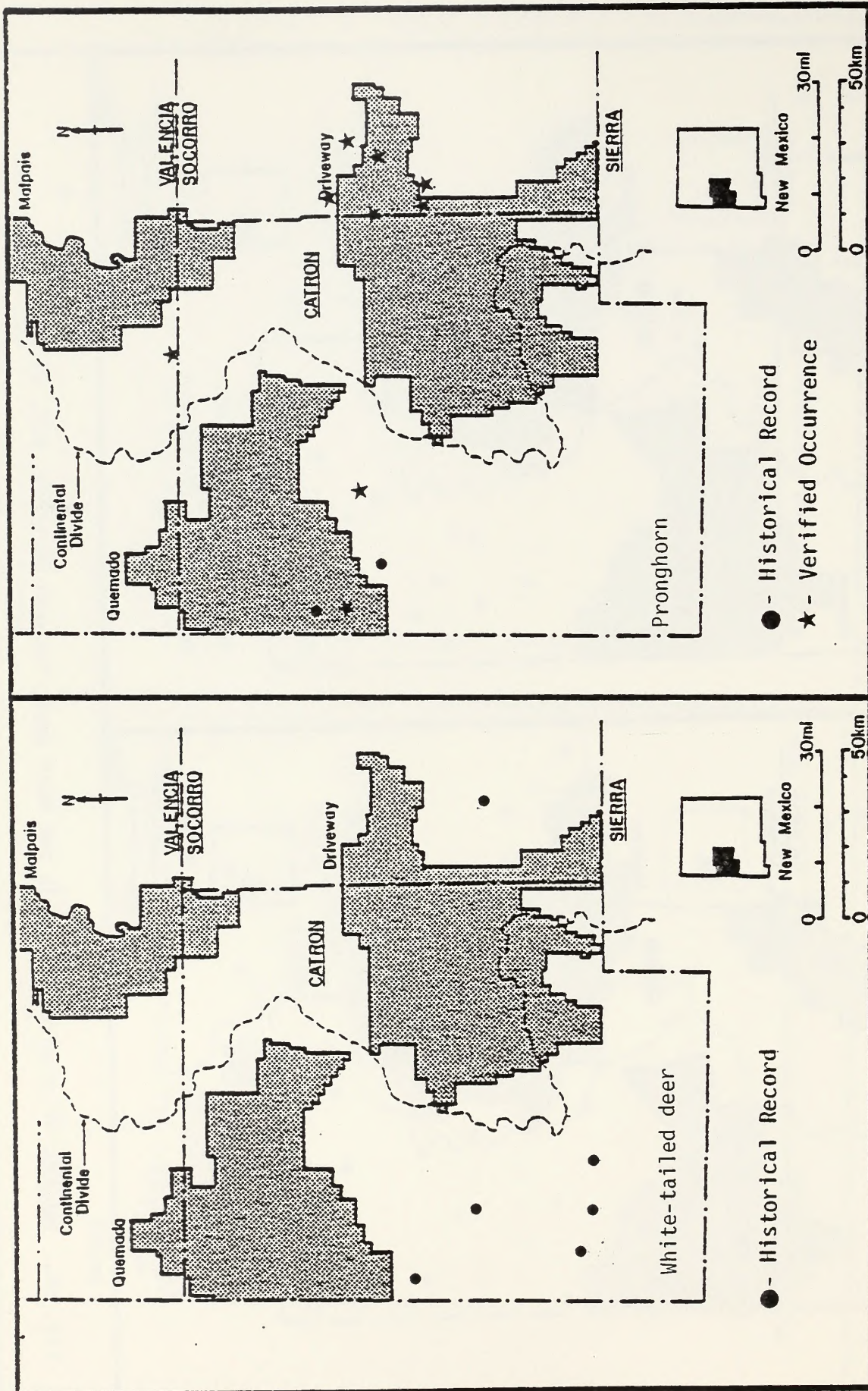


Fig. 51. Records of occurrence for white-tailed deer and pronghorn, Socorro District, BLM, 1979.

APPENDIX 2

Table 48. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #1 - 016</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/29	Bendire's Thrasher	8	-	-
7/2	" "	12	-	-
6/29	Brewer's Sparrow	36	.39	91.3
7/2	" "	31	.21	149.4
7/5	" "	30	.23	132.8
6/29	Common Raven	2	.24	8.3
7/2	" "	1	-	-
7/2	Golden Eagle	1	-	-
6/29	Horned Lark	48	.26	182.6
7/2	" "	65	.46	141.1
7/5	" "	63	.26	240.7
7/2	Hummingbird(<i>Selasphorus</i> sp.)	1	.16	6.3
6/29	Lark Sparrow	5	.30	16.6
7/2	" "	1	-	-
7/2	Meadowlark (<i>Sturnella</i> sp.)	24	.96	25.0
7/5	" "	6	.96	6.3
7/2	Prairie Falcon	1	-	-
6/29	Swainson's Hawk	1	-	-
6/29	Vesper Sparrow	12	.64	18.8
6/29	Western Meadowlark	2	-	-
11/6	Horned Lark	48	.25	190.9
11/7	" "	17	.29	58.1
11/6	Rough-legged Hawk	2	-	-
11/7	Scaled Quail	7	-	-

Table 49. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #2 - 002</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/2	American Kestrel	1	.12	8.3
7/2	Common Nighthawk	2	.12	16.6
6/29	Horned Lark	80	.28	282.2
7/2	" "	65	.41	157.7
7/5	" "	95	.31	307.1
6/29	Lark Sparrow	2	.48	16.6
6/29	Meadowlark (<i>Sturnella</i> sp.)	8	.48	16.6
7/2	Mourning Dove	2	.12	16.6
7/5	" "	2	.12	16.6
7/2	Western Meadowlark	1	-	-
7/5	" "	8	-	-
<hr/>				
11/6	American Kestrel	1	-	-
11/7	Common Raven	1	-	-
11/6	Ferruginous Hawk	1	-	-
11/6	Horned Lark	14	.42	33.2
11/7	" "	18	.24	74.7
11/7	Rough-legged Hawk	1	-	-

Table 50. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #3 - 026</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
5/13	Acorn Woodpecker	2	.24	8.3
7/7	" "	2	.24	8.3
5/13	American Kestrel	2	-	-
7/6	" "	3	-	-
7/7	" "	1	-	-
5/13	American Robin	5	.20	24.9
7/6	" "	1	-	-
5/13	Ash-throated Flycatcher	2	-	-
7/6	" "	6	.36	16.6
7/7	" "	4	-	-
7/7	Bendire's Thrasher	1	-	-
5/13	Bewick's Wren	2	.24	8.3
7/7	" "	1	-	-
7/7	Black-chinned Hummingbird	3	.18	16.6
5/13	Black-throated Gray Warbler	2	-	-
7/7	" "	2	-	-
5/13	Brown Towhee	6	.18	33.2
7/6	" "	4	-	-
7/7	" "	2	-	-
5/13	Brown-headed Cowbird	1	-	-
7/6	Cassin's Finch	3	-	-
5/13	Cassin's Kingbird	6	.72	8.3
7/6	" "	16	.39	41.5
7/7	" "	4	.48	8.3
5/13	Chipping Sparrow	1	-	-
7/6	" "	11	.33	33.2
7/7	" "	1	-	-
5/13	Common Bushtit	4	-	-
7/6	" "	15	-	-
7/7	" "	35	.12	290.5
5/13	Common Flicker	6	.96	6.3
7/6	" "	6	.96	6.3
7/7	" "	3	.36	8.3

Table 50. (continued)

<u>Transect #3 - 026</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/6	Common Nighthawk	1	.12	8.3
5/13	Curve-billed Thrasher	1	.12	8.3
7/6	" "	1	.12	8.3
5/13	Flycatcher (<i>Empidonax</i> sp.)	2	-	-
7/6	" "	14	.42	33.2
5/13	Flycatcher (<i>Myiarchus</i> sp.)	1	-	-
5/13	Gray Vireo	1	-	-
5/13	Gray-headed Junco	7	.42	16.6
7/7	" "	1	-	-
5/13	Great-horned Owl	1	-	-
5/13	Green-tailed Towhee	1	-	-
7/6	" "	1	-	-
7/6	Hairy Woodpecker	1	-	-
7/6	Hepatic Tanager	2	.12	16.6
5/13	House Wren	2	.24	8.3
7/7	Hummingbird (<i>Archilochus</i> sp.)	3	.12	24.9
5/13	Lewis' Woodpecker	1	-	-
7/6	" "	1	-	-
5/13	MacGillivray's Warbler	1	-	-
5/13	Mountain Bluebird	1	-	-
7/6	" "	1	-	-
5/13	Mourning Dove	8	.32	24.9
7/6	" "	7	.14	49.8
7/7	" "	1	-	-
7/6	Orange-crowned Warbler	1	-	-
5/13	Ovenbird	3	.12	24.9
5/13	Pine Siskin	6	.24	25.0
5/13	Pinyon Jay	4	-	-
7/6	" "	7	-	-
7/7	" "	120	.15	788.5

Table 50. (continued)

<u>Transect #3 - 026</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
5/13	Plain Titmouse	4	.32	12.5
7/6	" "	4	.32	12.5
7/7	" "	3	.36	8.3
7/6	Red-breasted Nuthatch	2	-	-
5/13	Red-tailed Hawk	1	.12	8.3
7/6	" "	1	-	-
5/13	Rock Wren	19	.54	35.0
7/6	" "	36	.29	124.5
7/7	" "	20	.40	49.8
7/6	Rose-breasted Grosbeak	1	-	-
5/13	Rufous-sided Towhee	2	.20	24.9
7/6	" "	10	.60	16.6
7/7	" "	4	.48	8.3
5/13	Scrub Jay	6	.32	18.8
7/6	" "	1	.16	6.3
5/13	Solitary Vireo	2	-	-
7/6	" "	2	-	-
5/13	Swainson's Thrush	1	-	-
5/13	Violet-green Swallow	4	-	-
7/6	" "	3	-	-
7/6	Western Bluebird	6	.18	33.2
7/6	Western Tanager	2	.12	16.6
7/6	Western Wood Pewee	6	.60	10.0
5/13	White-breasted Nuthatch	3	-	-
7/6	" "	10	.40	24.9
5/13	Yellow-rumped Warbler	1	-	-
7/6	" "	2	-	-
<hr/>				
11/9	Chipping Sparrow	2	.12	16.6
11/8	Dark-eyed Junco	30	.36	83.0
11/9	" "	29	.29	99.6

Table 50. (continued)

<u>Transect #3 - 026</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
11/8	Gray-headed Junco	1	-	-
11/9	" "	17	-	-
11/9	Great Horned Owl	1	-	-
11/9	Mountain Bluebird	5	-	-
11/9	Pinyon Jay	7	-	-
11/9	Plain Titmouse	4	.16	25.0
11/9	Red-tailed Hawk	1	-	-
11/9	Rock Wren	3	-	-
11/8	Ruby-crowned Kinglet	2	.24	8.3
11/9	" "	6	.14	41.5
11/8	Western Bluebird	2	.24	8.3
11/9	White-breasted Nuthatch	5	.60	8.3

Table 51. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #4 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/4	Acorn Woodpecker	2	-	-
7/4	American Kestrel	1	-	-
7/6	American Robin	2	-	-
6/30	Ash-throated Flycatcher	8	.24	33.2
7/4	" "	10	.30	33.2
7/6	" "	8	.32	24.9
6/30	Black-headed Grosbeak	1	.12	8.3
6/30	Black-throated Gray Warbler	4	-	-
6/30	Blue Grosbeak	1	-	-
7/4	Cassin's Kingbird	3	-	-
7/6	" "	3	-	-
6/30	Chipping Sparrow	2	.12	16.6
7/4	" "	2	-	-
7/4	Common Bushtit	2	.12	16.6
7/6	Common Flicker	1	.12	8.3
6/30	Common Raven	2	.16	12.5
7/4	" "	2	-	-
7/6	" "	1	-	-
6/30	Flycatcher (<i>Empidonax</i> sp.)	2	-	-
6/30	Gray Vireo	3	.12	24.9
6/30	House Finch	1	.12	8.3
6/30	Lucy's Warbler	4	-	-
6/30	Pinyon Jay	3	.24	12.5
7/4	Plain Titmouse	1	.12	8.3
7/6	" "	24	.29	83.0
7/4	Purple Martin	1	.12	8.3
7/4	Rock Wren	8	-	-
7/6	" "	6	.36	16.6
6/30	Rough-winged Swallow	1	.12	8.3

Table 51. (continued)

<u>Transect #4 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/30	Rufous-sided Towhee	2	.24	8.3
7/6	" "	1	-	-
6/30	Scrub Jay	4	.48	8.3
7/4	" "	4	.48	8.3
7/6	" "	11	.24	12.5
6/30	Violet-green Swallow	1	-	-
6/30	Western Bluebird	1	.12	8.3
7/6	" "	4	.24	16.6
6/30	White-breasted Nuthatch	4	.64	6.3
<hr/>				
11/9	Brown Towhee	4	.24	16.6
11/8	Chipping Sparrow	4	.24	16.6
11/8	Common Bushtit	7	-	-
11/8	Common Raven	1	-	-
11/9	" "	3	-	-
11/8	Dark-eyed Junco	2	.12	16.6
11/9	" "	4	.48	8.3
11/9	Gray-headed Junco	2	.24	8.3
11/9	House Finch	5	-	-
11/8	Pinyon Jay	2	-	-
11/8	Plain Titmouse	3	-	-
11/9	" "	8	.19	41.5
11/8	Ruby-crowned Kinglet	1	.12	8.3
11/8	Western Bluebird	4	-	-
11/9	" "	1	-	-
11/8	White-breasted Nuthatch	1	-	-

Table 52. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #5 - 011</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/30	American Kestrel	2	.24	8.3
7/4	" "	2	.12	16.6
6/30	Cassin's Kingbird	4	-	-
7/6	" "	6	.72	8.3
6/30	Common Flicker	1	-	-
7/6	Common Nighthawk	1	-	-
6/30	Common Raven	3	.36	8.3
6/30	Gray Vireo	1	-	-
7/4	" "	1	-	-
6/30	Horned Lark	17	.20	83.0
7/4	" "	10	.20	49.8
7/6	" "	4	.16	24.9
6/30	Mockingbird	2	-	-
7/4	" "	2	-	-
6/30	Mountain Bluebird	4	.12	33.2
7/4	" "	7	.14	49.8
7/6	" "	1	-	-
7/6	Mourning Dove	2	-	-
6/30	Pinyon Jay	2	-	-
6/30	Plain Titmouse	2	-	-
7/4	Western Meadowlark	4	.48	8.3
7/6	" "	13	-	-
11/9	Common Bushtit	7	-	-
11/9	Dark-eyed Junco	1	-	-
11/8	Horned Lark	92	.16	589.3
11/9	" "	36	.14	249.0

Table 53. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico. 1979.

<u>Transect #6 - 034</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/10	Acorn Woodpecker	3	.36	8.3
7/11	" "	5	.30	16.6
6/30	American Kestrel	1	-	-
7/10	" "	1	-	-
7/11	" "	5	-	-
7/10	American Robin	4	.48	8.3
7/11	" "	15	.60	24.9
6/30	Ash-throated Flycatcher	10	.30	33.2
7/10	" "	5	-	-
7/11	" "	6	.36	16.6
6/30	Band-tailed Pigeon	7	-	-
6/30	Bewick's Wren	2	.12	16.6
7/11	" "	4	.12	33.2
6/30	Broad-tailed Hummingbird	2	-	-
7/11	Brown-headed Cowbird	11	.59	18.8
6/30	Canyon Wren	22	.53	41.5
7/10	" "	2	-	-
7/11	" "	12	.14	83.0
6/30	Cassin's Kingbird	2	-	-
7/10	" "	1	-	-
7/11	" "	3	.48	6.3
6/30	Chipping Sparrow	2	.12	16.6
7/11	" "	2	.12	16.6
6/30	Common Flicker	6	.96	6.3
7/10	" "	8	.32	24.9
7/11	" "	9	-	-
6/30	Common Nighthawk	1	-	-
7/10	" "	3	.36	8.3
6/30	Flammulated Owl	1	-	-
6/30	Flycatcher (<i>Empidonax</i> sp.)	8	.48	16.6
7/10	" "	4	.24	16.6
7/11	" "	12	.24	49.8

Table 53. (continued)

Transect #6 - 034				
Date	Species	Observed Density (Birds/40 ha)	CD	Estimated Density (Birds/40 ha)
7/11	Grace's Warbler	2	-	-
6/30	Gray-headed Junco	6	.48	16.6
7/10	" "	3	-	-
7/11	" "	3	.36	16.6
6/30	Hammond's Flycatcher	1	-	-
6/30	Hepatic Tanager	2	-	-
6/30	Lesser Goldfinch	3	-	-
7/11	" "	4	-	-
7/10	Mexican Jay	1	.12	8.3
7/11	" "	2	-	-
6/30	Mountain Bluebird	2	-	-
7/10	" "	1	-	-
7/11	" "	6	.36	16.6
7/10	Mountain Chickadee	1	.12	8.3
7/11	" "	12	.14	83.0
6/30	Mourning Dove	3	.36	8.3
7/10	" "	2	-	-
7/11	" "	7	.84	8.3
6/30	Olive-sided Flycatcher	1	-	-
7/10	Pygmy Nuthatch	7	.12	58.1
7/11	" "	8	-	-
6/30	Plain Titmouse	2	-	-
7/11	" "	8	-	-
7/10	Purple Martin	6	.36	16.6
7/11	" "	7	.12	58.1
6/30	Red-breasted Nuthatch	1	-	-
7/11	Red-tailed Hawk	1	.12	8.3
6/30	Rock Wren	38	.76	49.8
7/10	" "	6	.72	8.3
7/11	" "	4	.16	24.9
7/10	Ruby-crowned Kinglet	1	.12	8.3

Table 53. (continued)

<u>Transect #6 - 034</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/30	Rufous-sided Towhee	6	.48	12.5
7/10	" "	1	-	-
7/11	" "	12	.36	33.2
7/11	Scrub Jay	1	-	-
6/30	Solitary Vireo	2	-	-
7/10	" "	4	-	-
7/11	" "	6	.14	41.5
6/30	Steller's Jay	4	-	-
7/10	" "	4	-	-
7/11	" "	4	-	-
6/30	Violet-green Swallow	21	-	-
7/10	" "	21	-	-
7/11	" "	23	-	-
6/30	Western Bluebird	4	-	-
7/10	" "	1	-	-
7/11	" "	9	-	-
7/10	Western Wood Pewee	8	.25	31.5
7/11	" " "	9	.72	12.5
7/10	White-breasted Nuthatch	1	-	-
7/11	" "	4	.48	8.3
7/11	Williamson's Sapsucker	2	.12	16.6
6/30	Willow Flycatcher	4	.48	8.3
<hr/>				
12/14	American Robin	4	.12	33.2
12/13	Bald Eagle	1	-	-
12/14	" "	1	-	-
12/14	Common Bushtit	10	.12	83.0
12/14	Common Flicker	1	-	-
12/14	Cooper's Hawk	1	-	-
12/13	Gray-headed Junco	8	-	-
12/14	" "	3	.12	24.9

Table 53. (continued)

<u>Transect #6 - 034</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
12/13	Hairy Woodpecker	2	-	-
12/14	" "	1	-	-
12/13	Mountain Chickadee	4	-	-
12/13	Pinyon Jay	67	.14	456.5
12/14	" "	10	.30	33.2
12/13	Plain Titmouse	3	-	-
12/14	" "	8	.24	33.2
12/14	Red-tailed Hawk	1	-	-
12/14	Rock Wren	3	-	-
12/14	Steller's Jay	2	-	-
12/14	White-breasted Nuthatch	8	.14	58.1

2.55 - 2 w ~~40~~ ha

Table 54. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

Transect #7 - 036				
Date	Species	Observed Density (Birds/40 ha)	CD	Estimated Density (Birds/40 ha)
6/27	American Kestrel	2	-	-
7/12	" "	3	-	-
6/27	Bendire's Thrasher	26	-	-
7/12	" "	12	-	-
6/27	Brewer's Sparrow	34	.22	157.7
7/12	" "	50	.20	249.0
6/27	Brown Towhee	3	.12	24.9
7/12	Cassin's Kingbird	2	-	-
6/27	Chipping Sparrow	4	.24	16.6
7/12	" "	4	-	-
6/27	Common Raven	3	-	-
6/27	Green-tailed Towhee	20	.60	33.2
7/12	" "	18	.27	66.2
6/27	Horned Lark	13	.20	66.4
7/12	" "	12	.36	33.2
7/12	Hummingbird (<i>Selasphorus</i> sp.)	1	-	-
6/27	Mountain Bluebird	2	-	-
7/12	" "	15	.12	124.0
7/12	Pinyon Jay	3	.12	24.9
6/27	Rock Wren	26	.78	33.2
7/12	" "	10	.59	17.0
7/12	Rough-winged Swallow	2	.12	16.2
6/27	Rufous-sided Towhee	2	-	-
6/27	Violet-green Swallow	7	-	-
7/12	" "	5	.15	33.2
<hr/>				
11/20	Brewer's Sparrow	2	.24	8.3
11/20	Brown Towhee	6	.19	31.3
11/20	Dark-eyed Junco	7	.17	41.5
11/21	" "	9	.18	49.8

Table 54. (continued)

<u>Transect #7 - 036</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
11/21	Gray-headed Junco	4	.12	33.2
11/20	Horned Lark	43	.24	182.6
11/20	Merlin	1	-	-
11/21	Red-tailed Hawk	1	-	-
11/21	Sage Sparrow	2	.12	16.6
11/20	White-crowned Sparrow	4	-	-
11/21	" "	12	.14	83.0

Table 55. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #8 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/12	American Kestrel	2	-	-
7/20	" "	2	-	-
7/12	Ash-throated Flycatcher	12	.18	66.4
7/20	" "	3	.12	18.9
7/12	Bewick's Wren	1	.12	8.3
7/20	Cassin's Kingbird	1	.12	8.3
7/12	Chipping Sparrow	8	.32	24.9
7/20	" "	17	.26	66.4
7/28	" "	14	.19	74.7
7/28	Common Bushtit	11	.12	91.3
7/12	Common Flicker	4	.16	24.9
7/20	" "	3	-	-
7/28	" "	4	.16	24.9
7/28	Common Nighthawk	5	.20	24.9
7/12	Common Raven	1	.12	8.3
7/12	Flycatcher (<i>Empidonax</i> sp.)	3	-	-
7/20	" "	1	-	-
7/28	Great Horned Owl	1	.12	8.3
7/12	Horned Lark	4	-	-
7/20	Lark Sparrow	4	-	-
7/20	Mexican Jay	1	-	-
7/28	Mountain Bluebird	2	-	-
7/12	Mountain Chickadee	7	.21	33.2
7/20	" "	7	.43	16.3
7/28	" "	14	.34	41.5
7/12	Mourning Dove	3	-	-
7/28	" "	11	.22	49.8
7/12	Pinyon Jay	1	.12	8.3
7/28	" "	1	-	-
7/12	Plain Titmouse	65	.12	539.2
7/20	" "	12	.21	58.1
7/28	" "	17	.10	83.0

Table 55. (continued)

Transect #8 - 005/007				
Date	Species	Observed Density (Birds/40 ha)	CD	Estimated Density (Birds/40 ha)
7/20	Rufous Hummingbird	1	-	-
7/12	Scrub Jay	2	-	-
7/20	Violet-green Swallow	6	.72	8.3
7/28	" "	1	.12	8.3
7/12	Western Bluebird	2	-	-
7/20	" "	3	-	-
7/12	White-breasted Nuthatch	2	-	-
7/28	" "	2	-	-
<hr/>				
11/20	Common Flicker	1	-	-
11/21	" "	1	.20	5.0
11/20	Common Raven	1	.12	8.3
11/21	" "	1	-	-
11/21	Dark-eyed Junco	23	.31	74.7
11/20	Downy Woodpecker	1	-	-
11/20	Mountain Bluebird	4	-	-
11/21	" "	1	-	-
11/21	Mountain Chickadee	5	.20	24.9
11/20	Plain Titmouse	6	.36	16.6
11/21	" "	5	.30	16.6
11/20	Scrub Jay	4	.12	33.2
11/21	Western Bluebird	10	.24	41.5
11/20	White-breasted Nuthatch	1	-	-
11/21	" "	2	.24	8.3

Table 56. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #9 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/28	American Kestrel	1	-	-
7/28	American Robin	1	-	-
7/13	Ash-throated Flycatcher	1	.12	8.3
7/28	" "	4	.16	24.9
7/28	Bewick's Wren	3	.36	8.3
7/13	Black-throated Gray Warbler	1	.12	8.3
7/13	Broad-tailed Hummingbird	2	.12	16.6
7/13	Brown Towhee	2	-	-
7/14	" "	1	-	-
7/28	" "	5	.30	-
7/28	Cassin's Kingbird	1	-	-
7/13	Chipping Sparrow	4	.64	6.3
7/14	" "	9	.36	24.9
7/28	Common Bushtit	3	.12	24.9
7/28	Common Flicker	2	.32	6.3
7/14	Common Nighthawk	2	-	-
7/28	" "	11	.12	91.3
7/13	Flycatcher (<i>Empidonax</i> sp.)	7	.84	8.3
7/14	" "	5	.20	24.9
7/28	" "	2	.12	16.6
7/13	Gray Vireo	4	.48	8.3
7/28	Great-horned Owl	1	-	-
7/13	Green-tailed Towhee	1	.16	6.3
7/14	" "	1	.16	8.3
7/28	" "	2	.12	-
7/14	House Finch	1	.16	6.3
7/28	" "	6	.24	24.9
7/13	House Wren	12	.12	99.6
7/14	" "	2	-	-
7/14	Mexican Jay	9	-	-
7/28	" "	1	-	-

Table 56. (continued)

<u>Transect #9 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/28	Mockingbird	1	-	-
7/13	Mountain Bluebird	2	.12	16.6
7/14	" "	3	.36	8.3
7/28	" "	3	.12	24.9
7/13	Plain Titmouse	8	.96	8.3
7/28	" "	12	.72	16.6
7/28	Rock Wren	10	.32	31.3
7/13	Scrub Jay	2	.32	6.3
7/13	Violet-green Swallow	3	.18	16.6
7/14	" "	6	.18	33.2
7/28	" "	10	.30	33.2
7/28	Western Bluebird	2	.24	8.3
7/28	White-breasted Nuthatch	2	-	-
<hr/>				
11/28	Brown Towhee	4	-	-
11/27	Common Raven	12	.12	99.6
11/28	" "	1	-	-
11/27	Dark-eyed Junco	9	.36	24.9
11/28	Hairy Woodpecker	2	-	-
11/27	Mountain Bluebird	1	.12	8.3
11/28	" "	2	-	-
11/27	Pinyon Jay	20	-	-
11/27	Plain Titmouse	4	.48	8.3
11/28	" "	4	-	-
11/28	Scrub Jay	2	.24	8.3
11/27	Townsend's Solitaire	4	.24	16.6

Table 57. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #10 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/12	American Robin	2	-	-
7/24	Ash-throated Flycatcher	5	.30	16.6
7/24	Broad-tailed Hummingbird	1	.12	8.3
7/12	Chipping Sparrow	23	.21	107.9
7/24	" "	45	.34	132.8
7/12	Common Flicker	1	.12	8.3
7/24	" "	4	.24	16.6
7/24	Common Nighthawk	6	.12	49.8
7/12	Common Raven	1	.12	8.3
7/24	" "	1	.16	6.3
7/12	Flycatcher (<i>Empidonax</i> sp.)	2	.24	8.3
7/12	Hairy Woodpecker	1	.20	5.0
7/12	House Wren	4	.16	25.0
7/24	" "	6	.48	12.5
7/24	Lesser Goldfinch	2	.12	16.6
7/12	Mountain Bluebird	1	.12	8.3
7/24	" "	4	.48	8.3
7/24	Mountain Chickadee	12	.72	16.6
7/24	Mourning Dove	2	-	-
7/24	Plain Titmouse	6	.16	37.5
7/12	Purple Martin	3	.12	24.9
7/24	" "	3	.12	24.9
7/24	Scrub Jay	1	.12	8.3
7/12	Violet-green Swallow	11	.66	16.6
7/24	" "	9	.18	49.8
7/12	Western Bluebird	4	.32	12.5
7/24	" "	1	-	-
7/24	Western Wood Pewee	2	.24	8.3
7/12	White-breasted Nuthatch	5	.15	33.2
7/24	" "	6	.72	8.3

Table 57. (continued)

<u>Transect #10 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
11/27	Common Raven	10	-	-
11/28	" "	3	.12	24.9
11/27	Dark-eyed Junco	3	.48	6.3
11/28	" "	7	.12	82.9
11/27	Gray-headed Junco	1	.20	5.0
11/28	" "	7	.17	41.5
11/28	Mexican Jay	2	.40	5.0
11/27	Mountain Bluebird	38	.12	315.4
11/28	" "	10	.12	82.9
11/28	Mountain Chickadee	2	.12	16.6
11/28	Pinyon Jay	16	-	-
11/28	Plain Titmouse	3	.48	6.3
11/27	Scrub Jay	1	-	-
11/28	White-breasted Nuthatch	2	.24	8.3

Table 58. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #11 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/17	Acorn Woodpecker	1	-	-
6/26	American Kestrel	1	-	-
7/17	" "	1	-	-
7/19	" "	7	-	-
6/26	Ash-throated Flycatcher	10	.60	16.6
7/19	" "	2	-	-
7/17	Bewick's Wren	3	.12	24.9
7/17	Black-capped Chickadee	4	.16	25.0
7/17	Brown Towhee	8	.48	16.6
7/17	Brown-headed Cowbird	4	-	-
6/26	Cassin's Kingbird	2	-	-
6/26	Chipping Sparrow	2	-	-
7/17	" "	9	.18	49.8
7/19	" "	43	.40	107.9
6/26	Common Bushtit	20	-	-
7/17	" "	15	-	-
7/19	" "	3	.12	24.9
6/26	Common Flicker	2	-	-
7/17	" "	6	.18	33.2
7/19	" "	5	.40	12.5
7/17	Common Nighthawk	2	-	-
7/19	" "	75	.22	348.6
7/19	Flycatcher (<i>Empidonax</i> sp.)	1	-	-
7/19	Gray Vireo	2	-	-
7/19	Lark Sparrow	2	.24	8.3
7/17	Lesser Nighthawk	1	-	-
7/17	MacGillivray's Warbler	1	.12	8.3
7/19	Mountain Bluebird	29	.17	166.0
7/19	Mountain Chickadee	4	.48	8.3

Table 58. (continued)

<u>Transect #11 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/26	Mourning Dove	1	.02	51.9
7/17	" "	2	-	-
7/17	Pinyon Jay	79	-	-
7/19	" "	5	-	-
7/17	Plain Titmouse	21	.28	74.7
7/19	" "	8	.48	16.6
6/26	Rock Wren	16	-	-
7/17	" "	14	.17	83.0
6/26	Rufous-sided Towhee	1	-	-
6/26	Scrub Jay	3	-	-
7/17	" "	4	.48	8.3
7/19	Violet-green Swallow	2	-	-
6/26	Western Bluebird	2	-	-
7/19	" "	2	.24	8.3
7/17	White-breasted Nuthatch	4	-	-
<hr/>				
12/5	American Robin	2	-	-
12/6	" "	2	-	-
12/6	Brown Towhee	1	.12	8.3
12/6	Common Flicker	2	.24	8.3
12/5	Common Raven	1	.12	8.3
12/6	" "	1	-	-
12/5	Cooper's Hawk	1	-	-
12/5	Dark-eyed Junco	40	.34	116.2
12/6	" "	33	.15	215.8
12/5	Mountain Bluebird	7	-	-
12/6	" "	11	-	-
12/6	Hairy Woodpecker	2	.24	8.3
12/5	Horned Lark	2	.12	16.6
12/6	" "	2	-	-

Table 59. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #12 - 002</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/26	American Kestrel	2	.24	8.3
7/17	" "	4	.08	51.9
6/26	Ash-throated Flycatcher	4	-	-
6/26	Brown Towhee	1	-	-
7/17	Chipping Sparrow	2	-	-
6/26	Common Flicker	1	-	-
6/26	Common Raven	2	-	-
7/17	" "	2	.12	16.6
6/26	Horned Lark	44	.35	124.5
7/17	" "	52	.16	33.2
6/26	Lark Sparrow	2	-	-
6/26	Meadowlark (<i>Sturnella</i> sp.)	7	-	-
7/17	" "	10	-	-
6/26	Mockingbird	2	-	-
7/17	" "	1	-	-
6/26	Pinyon Jay	2	-	-
7/17	" "	3	-	-
6/26	Rock Wren	14	-	-
7/17	" "	6	-	-
<hr/>				
11/29	Common Raven	1	-	-
11/30	" "	1	.12	8.3
11/29	Horned Lark	16	.19	83.0
11/30	" "	17	.15	116.2
11/30	Mountain Bluebird	1	-	-

Table 59. (continued)

<u>Transect #12 - 002</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
12/5	Pinyon Jay	3	-	-
12/6	" "	4	-	-
12/5	Plain Titmouse	4	.24	16.6
12/6	" "	9	.22	41.5
12/5	Townsend's Solitaire	4	.48	8.3
12/6	" "	2	-	-
12/5	White-breasted Nuthatch	2	-	-
12/6	" "	1	-	-

Table 60. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #13 - 004</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/14	American Kestrel	1	-	-
7/17	" "	5	.20	24.9
6/28	Common Nighthawk	1	.12	8.3
6/28	Common Raven	1	-	-
6/14	Eastern Meadowlark	2	-	-
6/14	Horned Lark	26	.78	33.2
6/28	" "	4	-	-
7/17	" "	9	.36	24.9
7/17	Meadowlark (<i>Sturnella</i> sp.)	1	.12	8.3
6/28	Western Meadowlark	4	-	-
<hr/>				
11/29	Common Raven	3	.36	8.3
11/30	" "	2	.12	16.6
11/29	Horned Lark	10	.12	82.9
11/30	" "	17	.12	141.1

Table 61. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #14 - 014</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds 40/ha)</u>
7/18	American Kestrel	1	-	-
7/19	Ash-throated Flycatcher	2	-	-
7/19	Brewer's Sparrow	3	.36	8.3
7/18	Brown Towhee	2	-	-
7/18	Chipping Sparrow	2	-	-
7/19	Eastern Meadowlark	8	-	-
7/10	Horned Lark	24	.72	33.2
7/18	" "	23	.17	132.8
7/19	" "	23	-	-
7/18	Loggerhead Shrike	1	-	-
7/18	Meadowlark (<i>Sturnella</i> sp.)	32	-	-
7/10	Mockingbird	3	-	-
7/18	"	4	-	-
7/10	Say's Phoebe	2	.24	8.3
7/10	Western Meadowlark	4	.64	6.3
7/19	" "	9	-	-
<hr/>				
11/24	American Kestrel	1	-	-
11/24	Common Raven	3	.36	8.3
11/26	" "	6	-	-
11/26	Golden Eagle	1	-	-
11/24	Horned Lark	21	.42	49.8
11/26	" "	4	.24	16.6

Table 62. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #15 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/18	Ash-throated Flycatcher	2	-	-
7/19	" "	4	-	-
7/18	Bewick's Wren	6	-	-
7/18	Blue-gray Gnatcatcher	2	-	-
7/11	Brown Towhee	2	.24	8.3
7/18	" "	2	-	-
7/11	Brown-headed Cowbird	1	.12	8.3
7/18	Cassin's Kingbird	3	.12	24.9
7/11	Chipping Sparrow	3	.16	24.9
7/18	Common Flicker	2	-	-
7/19	" "	2	-	-
7/19	Common Nighthawk	2	.12	16.6
7/11	Flycatcher (<i>Empidonax</i> sp.)	4	.48	8.3
7/19	Horned Lark	14	-	-
7/19	Hummingbird (<i>Trochilidae</i> sp.)	1	.12	8.3
7/18	Lark Bunting	2	.24	8.3
7/18	Mexican Jay	6	.18	33.2
7/19	" "	1	-	-
7/11	Mountain Bluebird	6	.18	33.2
7/18	" "	1	-	-
7/19	" "	7	.28	24.9
7/11	Mourning Dove	1	-	-
7/18	" "	1	-	-
7/19	" "	1	.12	8.3
7/11	Pinyon Jay	1	-	-
7/18	" "	7	-	-
7/11	Plain Titmouse	16	.48	33.2
7/18	" "	4	-	-
7/19	" "	24	.48	49.8
7/19	Red-tailed Hawk	1	-	-

Table 62. (continued)

<u>Transect #15 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/11	Rock Wren	4	-	-
7/18	" "	10	-	-
7/19	" "	6	.72	8.3
7/11	Say's Phoebe	1	-	-
7/19	" "	2	.24	8.3
7/11	Scrub Jay	1	.24	4.1
7/18	" "	2	.24	8.3
7/11	Violet-green Swallow	2	.24	4.7
7/19	" "	1	.12	8.3
7/19	Western Bluebird	3	.12	24.9
7/18	Western Meadowlark	2	-	-
7/19	Western Wood Pewee	1	-	-
<hr/>				
11/24	Common Raven	1	-	-
11/26	" "	2	.24	8.3
11/24	Hairy Woodpecker	1	-	-
11/24	Mexican Jay	1	-	-
11/24	Plain Titmouse	1	.24	4.1
11/26	" "	4	.48	8.3
11/24	Western Bluebird	1	-	-
11/26	" "	3	.18	16.6

Table 63. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #16 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/13	Ash-throated Flycatcher	8	.21	37.5
7/14	" "	9	.27	33.2
7/20	" "	4	.48	8.3
7/13	Bewick's Wren	14	.19	74.7
7/14	" "	2	.24	8.3
7/20	" "	3	-	-
7/13	Brewer's Sparrow	2	.12	16.6
7/14	" "	2	-	-
7/13	Brown Towhee	2	-	-
7/14	" "	3	.36	8.3
7/20	" "	2	-	-
7/14	Cassin's Finch	3	-	-
7/13	Cassin's Kingbird	1	-	-
7/20	" "	3	-	-
7/13	Chipping Sparrow	15	.36	41.5
7/14	" "	10	.20	49.8
7/20	" "	8	-	-
7/13	Common Flicker	3	.36	8.3
7/20	" "	1	-	-
7/13	Common Nighthawk	1	-	-
7/20	" "	2	.12	16.6
7/14	Common Raven	1	-	-
7/13	Eastern Meadowlark	1	-	-
7/20	" "	2	-	-
7/14	Lesser Nighthawk	4	.12	33.2
7/13	Lincoln's Sparrow	2	.20	10.0
7/20	" "	1	.12	8.3
7/13	Meadowlark (<i>Sturnella</i> sp.)	6	-	-
7/14	" "	8	.64	12.5
7/14	Mockingbird	2	.48	4.2
7/13	Mountain Bluebird	1	-	-
7/14	" "	3	.18	16.6
7/20	" "	2	-	-

Table 63. (continued)

<u>Transect #16 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/13	Mourning Dove	4	.32	12.5
7/14	" "	7	.14	49.8
7/20	" "	4	.48	8.3
7/13	Plain Titmouse	7	.12	58.1
7/14	" "	6	.36	16.6
7/13	Rock Wren	2	.48	4.2
7/14	" "	7	.37	18.8
7/20	" "	2	.40	5.0
7/13	Western Meadowlark	6	-	-
7/20	" "	16	-	-
<hr/>				
12/6	Bluebird (<i>Sialia</i> sp.)	1	-	-
12/7	" "	10	-	-
12/6	Common Bushtit	9	.12	74.7
12/7	" "	12	.12	99.6
12/6	Common Flicker	1	-	-
12/6	Common Raven	1	-	-
12/7	" "	1	-	-
12/6	Dark-eyed Junco	3	.12	24.9
12/7	" "	12	.80	15.0
12/6	Pinyon Jay	8	.12	66.4
12/6	Plain Titmouse	2	.24	8.3

Table 64. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #17 - 008</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/13	Acorn Woodpecker	1	-	-
7/13	Ash-throated Flycatcher	5	.60	8.3
7/14	" "	14	.84	16.6
7/20	" "	8	-	-
7/14	Bewick's Wren	7	.28	24.9
7/20	" "	14	.12	116.2
7/14	Blue-gray Gnatcatcher	1	-	-
7/14	Brown-headed Cowbird	4	-	-
7/14	Cassin's Kingbird	2	-	-
7/13	Chipping Sparrow	12	.24	49.8
7/14	" "	4	.20	20.0
7/20	" "	8	.48	16.6
7/14	Common Bushtit	25	.12	207.5
7/14	Common Flicker	1	-	-
7/20	" "	2	-	-
7/14	Common Raven	5	-	-
7/14	Eastern Meadowlark	4	-	-
7/13	Flycatcher (<i>Empidonax</i> sp.)	2	.12	16.6
7/14	" "	2	.06	33.2
7/20	" "	1	.12	8.3
7/20	Hairy Woodpecker	1	-	-
7/14	House Finch	1	-	-
7/13	Mountain Bluebird	6	.12	49.8
7/14	" "	2	.20	10.0
7/20	" "	11	.17	66.4
7/13	Mountain Chickadee	1	.12	8.3
7/14	" "	1	.12	8.3
7/13	Mourning Dove	2	.24	8.3
7/14	" "	1	-	-
7/14	Olive-sided Flycatcher	2	.12	16.6

Table 64. (continued)

Transect #17 - 008				
Date	Species	Observed Density (Birds/40 ha)	CD	Estimated Density (Birds/40 ha)
7/13	Pinyon Jay	1	-	-
7/14	" "	1	-	-
7/13	Plain Titmouse	12	.12	99.6
7/14	" "	18	.43	41.5
7/20	" "	19	.57	33.2
7/13	Rock Wren	7	.42	16.6
7/14	" "	9	.36	24.9
7/20	" "	5	.60	8.3
7/14	Rufous-sided Towhee	3	-	-
7/14	Scrub Jay	1	-	-
7/20	" "	2	-	-
7/13	Violet-green Swallow	2	.24	8.3
7/13	Western Bluebird	1	.12	8.3
7/14	" "	3	.24	12.5
7/20	" "	2	.12	16.6
7/13	White-breasted Nuthatch	5	.80	6.3
7/14	" "	6	.48	12.5
7/20	" "	1	.12	8.3
<hr/>				
12/7	Common Raven	1	-	-
12/6	Dark-eyed Junco	1	.12	8.3
12/7	" "	2	.12	16.6
12/7	Mountain Bluebird	1	.12	8.3
12/6	Mountain Chickadee	1	.16	6.3
12/6	Pinyon Jay	7	.14	49.8
12/7	" "	27	.12	224.1
12/6	Plain Titmouse	4	.12	33.2
12/7	" "	2	.24	8.3
12/6	Townsend's Solitaire	2	.32	6.3
12/6	Western Bluebird	5	.20	24.9
12/7	" "	6	.12	49.8
12/6	White-breasted Nuthatch	2	.12	16.6
12/7	" "	2	.24	8.3

Table 65. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #18 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
5/16	Ash-throated Flycatcher	10	.24	20.8
8/9	Bell's Vireo	2	.24	8.3
5/16	Bewick's Wren	5	-	-
5/16	Black-tailed Hummingbird	1	-	-
8/9	" "	1	.20	5.0
8/9	Cassin's Kingbird	1	.12	8.1
5/16	Chipping Sparrow	8	.64	12.5
8/9	" "	21	.16	132.8
8/9	Common Flicker	1	-	-
8/9	Common Nighthawk	1	-	-
5/16	Flycatcher (<i>Empidonax</i> sp.)	6	.96	6.3
8/9	Goshawk	1	-	-
8/9	House Finch	2	-	-
8/9	House Wren	10	.30	33.2
8/9	Mexican Jay	1	-	-
5/16	Mountain Bluebird	4	.24	16.6
8/9	" "	2	-	-
5/16	Mountain Chickadee	5	.60	8.3
8/9	" "	6	.36	16.6
5/16	Mourning Dove	5	-	-
8/9	" "	2	.12	16.6
5/16	Plain Titmouse	4	.48	8.3
8/9	" "	2	-	-
5/16	Rufous-sided Towhee	8	.48	16.6
5/16	Scrub Jay	1	-	-
8/9	" "	1	-	-
5/16	Solitary Vireo	1	.16	6.3
5/16	Violet-green Swallow	9	.12	74.7
8/9	" "	2	.24	8.3

Table 65. (continued)

<u>Transect #18 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
5/16	Western Bluebird	5	.12	41.5
8/9	" "	1	-	-
5/16	Western Tanager	2	.12	16.1
12/1	American Robin	1	-	-
12/2	" "	6	.96	6.3
12/2	Brown Creeper	1	-	-
12/1	Brown Towhee	1	.12	8.3
12/2	Common Bushtit	20	-	-
12/1	Common Flicker	4	.48	8.3
12/2	" "	1	-	-
12/1	Common Raven	2	-	-
12/2	" "	2	-	-
12/1	Dark-eyed Junco	26	.21	124.5
12/2	" "	43	.22	190.9
12/2	Mountain Bluebird	3	-	-
12/1	Horned Lark	7	.12	58.1
12/2	" "	5	-	-
12/1	House Finch	6	-	-
12/1	Pinyon Jay	2	-	-
12/2	" "	3	-	-
12/1	Plain Titmouse	5	.50	10.0
12/2	" "	8	-	-
12/2	Scrub Jay	1	-	-
12/2	Sharp-shinned Hawk	1	-	-
12/1	Townsend's Solitaire	3	-	-
12/2	" "	2	-	-
12/2	White-breasted Nuthatch	4	.48	8.3

Table 66. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #19 - 022</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
8/7	American Kestrel	1	-	-
8/7	Black-tailed Hummingbird	1	-	-
8/7	Common Nighthawk	1	-	-
8/7	Common Raven	2	-	-
8/7	Horned Lark	71	.14	522.9
8/7	Killdeer	1	-	-
8/7	Mourning Dove	1	-	-
8/7	Rufous Hummingbird	1	.12	8.3
8/7	Violet-green Swallow	3	-	-
<hr/>				
11/14	Common Raven	1	-	-
11/15	" "	1	.12	8.3
11/14	Horned Lark	4	.32	12.5
11/15	" "	73	.59	124.5

Table 67. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #20 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/25	American Kestrel	1	-	-
7/26	" "	1	-	-
7/25	American Robin	1	.12	8.3
7/26	" "	1	-	-
7/25	Ash-throated Flycatcher	4	.32	12.5
7/26	" "	3	-	-
7/25	Bewick's Wren	3	.36	8.3
7/26	" "	1	.12	8.3
7/25	Black-headed Grosbeak	2	-	-
7/26	" "	3	.36	8.3
7/26	Black-throated Gray Warbler	3	.18	16.6
7/25	Brewer's Sparrow	2	-	-
7/25	Brown Towhee	2	.18	16.6
7/25	Cassin's Kingbird	2	-	-
7/25	Chipping Sparrow	20	.12	157.7
7/26	" "	38	.16	232.4
7/25	Common Flicker	4	.40	10.0
7/26	" "	7	.28	24.9
7/26	Common Nighthawk	1	-	-
7/26	Common Raven	1	-	-
7/25	Flycatcher (<i>Empidonax</i> sp.)	6	.36	16.6
7/26	" "	11	.66	16.6
7/26	Gray Vireo	9	.14	66.4
7/25	Green-tailed Towhee	4	.24	8.3
7/26	Hairy Woodpecker	2	.24	8.3
7/26	Hepatic Tanager	1	-	-
7/25	House Finch	6	.12	8.3
7/26	" "	4	.16	24.9
7/26	Lesser Goldfinch	1	-	-
7/26	Mexican Jay	3	.24	12.5

Table 67. (continued)

<u>Transect #20 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/25	Mountain Bluebird	1	-	-
7/25	Mountain Chickadee	21	.12	8.3
7/25	Mourning Dove	2	.24	8.3
7/26	" "	3	.18	16.6
7/26	Northern Oriole	1	-	-
7/25	Olive-sided Flycatcher	1	.16	6.3
7/25	Pine Siskin	15	.12	8.3
7/25	Pinyon Jay	7	-	-
7/26	" "	1	-	-
7/25	Plain Titmouse	1	.20	5.0
7/26	" "	10	.60	16.6
7/25	Red-tailed Hawk	5	-	-
7/26	" "	1	-	-
7/25	Rock Wren	8	.48	16.6
7/26	" "	17	.41	41.5
7/26	Rufous Hummingbird	5	.12	41.5
7/25	Rufous-sided Towhee	4	.32	12.5
7/26	" "	6	.36	16.6
7/26	Say's Phoebe	1	-	-
7/25	Scrub Jay	6	.24	24.9
7/26	" "	2	-	-
7/25	Solitary Vireo	2	.40	5.0
7/26	" "	10	.32	31.3
7/25	Violet-green Swallow	28	.12	232.4
7/26	" "	13	.31	41.5
7/25	Western Bluebird	10	.15	66.4
7/26	" "	7	.84	8.3
7/25	Western Wood Pewee	4	.48	8.3
7/26	" " "	1	-	-
7/25	White-breasted Nuthatch	12	.72	16.6
7/26	" "	17	-	-

Table 67. (continued)

<u>Transect #20 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
11/16	Common Flicker	6	-	-
11/17	" "	2	-	-
11/16	Common Raven	2	-	-
11/17	" "	2	-	-
11/16	Dark-eyed Junco	105	.21	506.3
11/17	" "	161	.38	423.3
11/16	Mexican Jay	161	.38	423.3
11/17	" "	4	.24	16.6
11/16	Mountain Bluebird	27	.81	33.2
11/17	" "	4	.12	33.2
11/16	Mountain Chickadee	4	.12	33.2
11/16	Pinyon Jay	42	-	-
11/17	" "	45	-	-
11/16	Plain Titmouse	6	.14	41.5
11/17	" "	25	.40	62.5
11/17	Rock Wren	3	-	-
11/16	Rufous-sided Towhee	1	-	-
11/17	" "	2	-	-
11/17	Scrub Jay	1	-	-
11/16	Townsend's Solitaire	9	.54	16.6
11/17	" "	7	.21	33.2
11/16	Western Bluebird	4	-	-
11/17	" "	11	.17	66.4
11/16	White-breasted Nuthatch	5	.60	8.3
11/17	" "	5	-	-

Table 68. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

Transect #21 - 032				
Date	Species	Observed Density (Birds/40 ha)	CD	Estimated Density (Birds/40 ha)
7/29	American Kestrel	3	-	-
7/29	Bendire's Thrasher	1	-	-
8/2	" "	3	-	-
8/2	Bewick's Wren	6	-	-
7/29	Brewer's Sparrow	1	-	-
8/2	" "	8	.24	33.2
8/2	Cassin's Kingbird	1	.12	8.3
6/20	Chipping Sparrow	3	-	-
7/29	" "	1	-	-
6/20	Common Raven	4	.12	33.2
7/29	" "	1	.12	8.3
8/2	" "	1	.12	8.3
8/2	Eastern Meadowlark	2	.16	12.5
8/2	Green-tailed Towhee	2	.24	8.3
6/20	Horned Lark	36	.33	107.9
7/29	" "	76	.14	539.5
8/2	" "	34	.51	15.6
6/20	Lark Sparrow	12	.36	33.2
7/29	" "	1	-	-
8/2	" "	21	-	-
6/20	Meadowlark (<i>Sturnella</i> sp.)	4	-	-
8/2	Mockingbird	3	.36	8.3
8/2	Pinyon Jay	10	.12	22.1
8/2	Rock Wren	1	-	-
7/29	Say's Phoebe	1	-	-
8/2	Vesper Sparrow	43	-	-
6/20	Violet-green Swallow	2	-	-
8/2	" "	2	.12	16.6
8/2	Western Meadowlark	16	.21	74.7

Table 68. (continued)

<u>Transect #21 - 032</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
11/14	Common Raven	10	.12	83.0
11/15	" "	1	-	-
11/14	Horned Lark	24	.22	107.9
11/15	" "	4	.48	8.3
11/14	Mountain Bluebird	7	.14	49.8
11/14	Starling	40	.12	33.2

Table 69. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #22 - 031</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/13	Ash-throated Flycatcher	2	.32	6.3
7/25	" "	5	.27	18.8
7/26	" "	6	-	-
7/25	Bewick's Wren	3	.36	24.9
6/13	Black-tailed Hummingbird	4	-	-
7/26	Brown Towhee	1	-	-
7/25	Canyon Wren	2	-	-
7/26	" "	6	-	-
7/26	Cassin's Kingbird	4	-	-
7/25	Chipping Sparrow	1	-	-
7/26	" "	4	.12	33.2
6/13	Flycatcher (<i>Empidonax</i> sp.)	2	-	-
7/25	Hairy Woodpecker	1	.12	8.3
7/25	Hepatic Tanager	1	-	-
6/13	Hermit Thrush	2	-	-
7/26	House Finch	4	.12	33.2
6/13	Mourning Dove	1	-	-
7/26	" "	1	.12	8.3
6/13	Ovenbird	1	-	-
7/25	Pinyon Jay	3	-	-
7/26	" "	6	-	-
7/25	Plain Titmouse	1	.12	8.3
7/26	" "	2	-	-
7/25	Prairie Falcon	1	.12	8.3
7/26	" "	1	-	-
6/13	Rock Wren	1	-	-
7/25	" "	21	.51	41.5
7/26	" "	19	.33	58.1
7/26	Sharp-shinned Hawk	1	.12	8.3
7/25	Townsend's Solitaire	2	-	-

Table 69. (continued)

<u>Transect #22 - 031</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/13	Violet-green Swallow	12	.14	83.0
7/25	" "	2	.12	16.6
7/25	Western Bluebird	2	.12	16.6
7/25	Western Wood Pewee	1	.24	4.2
7/26	White-breasted Nuthatch	2	-	-
<hr/>				
11/16	Common Raven	3	.12	24.9
11/17	" "	1	.12	8.3
11/16	Dark-eyed Junco	3	-	-
11/17	" "	2	-	-
11/16	Mountain Bluebird	1	-	-
11/16	Pinyon Jay	70	.14	498.0
11/16	Western Bluebird	2	-	-

Table 70. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

Transect #23 - 009				
Date	Species	Observed Density (Birds/40 ha)	CD	Estimated Density (Birds/40 ha)
7/27	American Kestrel	2	.24	8.3
7/20	Ash-throated Flycatcher	16	.32	49.8
7/27	" "	1	-	-
8/2	" "	1	-	-
6/20	Bewick's Wren	3	.36	8.3
7/27	Black-throated Gray Warbler	8	.19	41.5
8/2	" " "	1	.12	8.3
8/2	Broad-tailed Hummingbird	1	-	-
8/2	Brown Towhee	8	.12	66.4
6/20	Cassin's Finch	1	.12	8.3
7/27	Cassin's Kingbird	2	-	-
6/20	Chipping Sparrow	15	.23	66.4
7/27	" "	13	.22	58.1
8/2	" "	14	.19	74.7
6/20	Common Flicker	1	-	-
8/2	" "	1	-	-
6/20	Flycatcher (<i>Empidonax</i> sp.)	6	.96	6.3
7/27	Lark Sparrow	2	.12	16.6
6/20	Lesser Goldfinch	1	.12	8.3
7/27	Mexican Jay	2	-	-
8/2	" "	2	-	-
6/20	Mockingbird	1	-	-
6/20	Mountain Bluebird	2	.12	16.6
7/27	" "	1	.16	6.3
6/20	Mourning Dove	3	-	-
7/27	" "	4	.12	33.2
8/2	" "	2	-	-
6/20	Pinyon Jay	16	-	-
7/27	" "	3	.18	16.6
6/20	Plain Titmouse	8	-	-
7/27	" "	1	-	-

Table 70. (continued)

<u>Transect #23 - 009</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/20	Red-breasted Nuthatch	2	.18	11.1
6/20	Rock Wren	18	.24	74.7
7/27	" "	13	.22	58.1
8/2	" "	10	.24	41.5
7/27	Rufous-sided Towhee	2	-	-
8/2	Solitary Vireo	2	.12	16.6
7/27	Violet-green Swallow	2	.16	12.5
8/2	" "	1	-	-
6/20	Western Wood Pewee	6	-	-
<hr/>				
11/14	American Robin	4	-	-
11/15	" "	2	.12	16.6
11/15	Cassin's Finch	2	.12	16.6
11/15	Common Bushtit	7	.12	58.1
11/14	Common Flicker	1	.12	8.3
11/15	" "	1	-	-
11/15	Common Raven	2	-	-
11/14	Dark-eyed Junco	25	.15	166.0
11/15	" "	25	.22	116.2
11/14	Gray-headed Junco	1	.12	8.3
11/14	Mexican Jay	1	-	-
11/15	" "	1	-	-
11/14	Mountain Bluebird	8	.96	8.3
11/15	" "	4	.16	24.9
11/15	Pinyon Jay	189	-	-
11/14	Plain Titmouse	6	.12	49.8
11/15	" "	10	-	-
11/14	Purple Finch	1	-	-
11/15	Ruby-crowned Kinglet	3	.36	8.3
11/14	Rufous-sided Towhee	1	.12	8.3

Table 70. (continued)

<u>Transect #23 - 009</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
11/15	Scrub Jay	1	-	-
11/14	Townsend's Solitaire	4	.32	12.5
11/15	" "	14	.28	49.8
11/14	Western Bluebird	20	.24	83.0
11/15	" "	3	-	-
11/14	White-breasted Nuthatch	1	.12	8.3
11/15	" "	3	-	-

Table 71. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #24 - 018</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/19	American Robin	4	.64	6.3
8/8	Broad-tailed Hummingbird	1	-	-
8/8	Chipping Sparrow	7	.17	41.5
6/19	Common Flicker	1	-	-
6/19	Common Nighthawk	2	.24	16.6
8/8	" "	1	.12	8.3
6/19	Flycatcher (<i>Empidonax</i> sp.)	6	.36	16.6
8/8	" "	2	-	-
6/19	Gray Flycatcher	1	.16	6.3
8/8	House Finch	2	.24	16.6
6/19	Pinyon Jay	6	.36	16.6
8/8	Red Crossbill	5	.30	16.6
6/19	Rock Wren	1	-	-
8/8	" "	10	.30	33.2
6/19	Violet-green Swallow	2	.12	16.6
8/8	" "	5	.15	33.2
6/19	Western Wood Pewee	3	.18	16.6
8/8	" " "	1	-	-
6/19	White-breasted Nuthatch	1	-	-
8/8	" "	2	-	-
12/20	Brown Towhee	1	.12	8.3
12/21	" "	2	.24	16.6
12/20	Common Flicker	2	.24	16.6
12/21	" "	1	-	-
12/20	Dark-eyed Junco	24	.48	49.8
12/20	Gray-headed Junco	30	.45	66.4
12/21	" "	8	.12	66.4
12/20	Red Crossbill	18	.12	149.4
12/21	" "	17	.12	141.1

Table 71. (continued)

<u>Transect #24 - 018</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
12/20	Rock Wren	2	.12	16.6
12/21	" "	1	.12	8.3
12/20	Townsend's Solitaire	1	.12	8.3
12/20	White-breasted Nuthatch	1	.12	8.3
12/21	" "	1	.12	8.3

Table 72. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #25 - 002</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/22	American Kestrel	1	-	-
6/22	American Robin	2	-	-
6/22	Ash-throated Flycatcher	2	-	-
6/22	Bendire's Thrasher	2	-	-
6/22	Bewick's Wren	4	-	-
6/22	Cassin's Kingbird	5	-	-
6/22	Chipping Sparrow	4	-	-
6/22	Common Flicker	6	-	-
6/22	Common Nighthawk	1	-	-
6/22	Common Raven	4	-	-
6/22	Flycatcher (<i>Empidonax</i> sp.)	4	-	-
6/22	Hepatic Tanager	2	-	-
6/22	Horned Lark	2	.16	12.5
6/22	Lewis' Woodpecker	2	.24	8.3
6/22	Mockingbird	1	-	-
6/22	Mourning Dove	4	.40	10.0
6/22	Pinyon Jay	13	.52	24.9
6/22	Plain Titmouse	3	-	-
6/22	Rock Wren	74	.64	116.2
6/22	Ruby-crowned Kinglet	1	-	-
6/22	Say's Phoebe	6	.36	16.6
6/22	Violet-green Swallow	1	-	-
6/22	Western Wood Pewee	1	.12	8.3
<hr/>				
12/20	Dark-eyed Junco	33	.16	207.5
12/21	" "	10	.12	83.0
12/20	Pinyon Jay	3	.12	24.9

Table 72. (continued)

<u>Transect #25 - 002</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
12/20	Rock Wren	2	.12	16.6
12/21	" "	8	.96	8.3
12/20	Townsend's Solitaire	1	.12	8.3
12/20	White-breasted Nuthatch	1	.12	8.3

Table 73. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #26 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/25	American Kestrel	1	.12	8.3
7/25	Ash-throated Flycatcher	2	.12	16.6
7/27	" "	8	.48	16.6
7/27	Bewick's Wren	4	.24	16.6
7/25	Black-throated Gray Warbler	2	.16	12.5
7/27	" " "	1	-	-
7/25	Chipping Sparrow	7	.28	24.9
7/27	" "	11	.27	41.5
7/27	Common Flicker	2	-	-
7/25	Cooper's Hawk	1	.12	8.3
7/27	Dusky Flycatcher	1	-	-
7/25	Flycatcher (<i>Empidonax</i> sp.)	4	.24	16.6
7/27	"	1	.16	6.3
7/27	Green-tailed Towhee	2	.32	6.3
7/25	Hairy Woodpecker	1	.20	5.0
7/27	Hepatic Tanager	1	-	-
7/25	House Finch	2	.12	16.6
7/27	" "	1	.12	8.3
7/27	Hummingbird (<i>Selasphorus</i> sp.)	1	.20	25.0
7/27	Lark Sparrow	4	-	-
7/25	Mexican Jay	5	.20	24.9
7/27	" "	6	-	-
7/25	Mountain Bluebird	1	-	-
7/27	" "	4	.48	8.3
7/27	Northern Shrike	1	.20	5.0
7/27	Pinyon Jay	2	-	-
7/25	Plain Titmouse	3	.36	8.3
7/27	" "	3	.12	24.9
7/25	Rock Wren	11	.33	33.2
7/27	" "	8	.24	33.2

Table 73. (continued)

<u>Transect #26 - 005/007</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/27	Solitary Vireo	2	-	-
7/25	Violet-green Swallow	1	-	-
7/27	" "	1	.12	8.3
7/27	Western Wood Pewee	1	-	-
7/25	White-breasted Nuthatch	3	.36	8.3
7/27	" "	8	-	-
<hr/>				
11/16	American Robin	1	.12	8.3
11/17	" "	1	-	-
11/16	Common Raven	1	-	-
11/17	" "	1	.12	8.3
11/16	Dark-eyed Junco	16	.64	24.9
11/17	" "	7	.14	49.8
11/16	Gray-headed Junco	1	.12	8.3
11/16	Hairy Woodpecker	1	-	-
11/16	Mountain Bluebird	6	.18	33.2
11/17	" "	13	.12	107.9
11/17	Plain Titmouse	4	-	-
11/16	Purple Finch	4	-	-
11/17	" "	15	.26	58.1
11/16	Scrub Jay	3	-	-
11/17	" "	2	-	-
11/17	Townsend's Solitaire	3	.18	16.6
11/16	Western Bluebird	8	.32	24.9
11/17	" "	6	.14	41.5
11/16	White-breasted Nuthatch	1	-	-
11/17	" "	2	.24	8.3

Table 74. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #27 - 021</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/22	Ash-throated Flycatcher	4	.24	16.6
8/10	Broad-tailed Hummingbird	1	.12	8.3
8/10	Cassin's Kingbird	1	.12	8.3
6/22	Chipping Sparrow	2	.24	8.3
8/10	Common Bushtit	2	.12	16.6
6/22	Common Nighthawk	1	.12	16.6
8/10	" "	9	-	-
6/22	Flycatcher (<i>Empidonax</i> sp.)	2	.24	8.3
6/22	Hairy Woodpecker	1	.16	6.3
6/22	Hepatic Tanager	7	.21	33.2
8/10	" "	3	-	-
8/10	Mountain Bluebird	5	.12	41.5
6/22	Mountain Chickadee	3	-	-
6/22	Mourning Dove	4	.24	16.6
8/10	" "	4	.12	33.2
6/22	Pinyon Jay	3	-	-
6/22	Plain Titmouse	1	.16	6.3
8/10	" "	2	-	-
8/10	Red Crossbill	1	-	-
6/22	Rock Wren	15	.30	49.8
8/10	" "	8	.24	33.2
6/22	Say's Phoebe	1	.12	8.3
6/22	Violet-green Swallow	8	.12	66.4
8/10	" "	3	.18	16.6
6/22	White-crowned Sparrow	3	.12	24.9
<hr/>				
11/18	American Robin	7	-	-
11/19	" "	10	-	-
11/19	Brown Towhee	1	.12	8.3

Table 74. (continued)

<u>Transect #27 - 021</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
11/18	Dark-eyed Junco	24	.18	132.8
11/19	" "	43	-	-
11/19	Red-tailed Hawk	1	-	-
11/19	Rock Wren	1	.16	6.3
11/18	Scrub Jay	1	-	-
11/18	Townsend's Solitaire	2	.40	5.0
11/19	" "	2	.24	8.3
11/19	White-breasted Nuthatch	1	-	-

Table 75. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #28 - 019/020</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
8/3	American Robin	5	.60	8.3
6/21	Ash-throated Flycatcher	8	-	-
8/3	" "	2	-	-
8/3	Black-headed Grosbeak	3	-	-
6/21	Brewer's Sparrow	8	-	-
6/21	Cassin's Kingbird	2	.16	12.5
8/3	" "	2	-	-
6/21	Chipping Sparrow	3	.48	6.3
8/3	" "	2	.16	12.5
6/21	Common Flicker	2	-	-
8/3	" "	4	-	-
6/21	Flycatcher (<i>Empidonax</i> sp.)	12	-	-
8/3	" "	1	-	-
8/3	Evening Grosbeak	2	.16	12.5
6/21	Hepatic Tanager	2	.12	16.6
8/3	House Finch	3	-	-
6/21	Lark Sparrow	5	-	-
8/3	Mexican Jay	1	-	-
6/21	Mountain Chickadee	2	.12	16.6
8/3	Mourning Dove	1	-	-
6/21	Olive-sided Flycatcher	2	-	-
8/3	Pine Grosbeak	2	.12	16.6
6/21	Pinyon Jay	16	.21	74.7
8/3	" "	29 ^{44.5} _{22.2}	.17 ^{3.8} _{3.9}	166.0 ^{224.07} _{120.3}
6/21	Plain Titmouse	2	-	-
8/3	Red Crossbill	2	.12	16.6
8/3	Red-tailed Hawk	1	-	-
6/21	Rock Wren	34	.51	66.4
8/3	" "	10	.30	33.2

Table 75. (continued)

<u>Transect #28 - 019/020</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/21	Say's Phoebe	2	-	-
8/3	" "	1	.12	8.3
6/21	Solitary Vireo	3	.24	12.5
6/21	Western Wood Pewee	8	.80	10.0
8/3	" " "	6	-	-
8/3	White-breasted Nuthatch	4	-	-
<hr/>				
12/12	American Robin	3	-	-
12/13	" "	2	-	-
12/13	Cassin's Finch	1	.16	6.3
12/12	Common Flicker	2	.24	8.3
12/12	Common Raven	4	.24	16.6
12/13	" "	2	.12	16.6
12/13	Dark-eyed Junco	9	.15	58.1
12/13	Gray-headed Junco	13	.13	99.6
12/13	Hairy Woodpecker	2	.40	5.0
12/13	Mountain Bluebird	20	.12	165.9
12/12	Pinyon Jay	58	1.00	58.1
12/13	" "	117	.12	954.5
12/12	Purple Finch	4	-	-
12/13	" "	9	.12	74.7
12/12	Red Crossbill	2	-	-
12/13	" "	39	.13	307.1
12/13	Red-breasted Nuthatch	3	.12	24.9
12/12	Townsend's Solitaire	2	.24	8.3
12/13	" "	5	.60	8.3
12/13	Western Bluebird	9	.12	74.7
12/13	White-breasted Nuthatch	1	-	-

Table 76. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #29 - 004</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
8/3	American Kestrel	1	-	-
6/22	Brewer's Sparrow	18	-	-
8/3	Cassin's Kingbird	1	-	-
6/22	Chipping Sparrow	4	.48	8.3
8/3	" "	5	.30	16.6
8/3	Common Nighthawk	1	.12	8.3
8/3	Common Raven	8	.96	8.3
6/22	Horned Lark	7	.21	33.2
8/3	" "	4	-	-
6/22	Lark Sparrow	4	-	-
8/3	Mockingbird	1	.12	8.3
6/22	Mountain Bluebird	3	.12	24.9
6/22	Rock Wren	4	-	-
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12/12	Common Flicker	1	-	-
12/12	Common Raven	9	.18	49.8
12/13	" "	8	.16	49.8
12/12	Horned Lark	1	.12	8.3
12/13	Mountain Bluebird	1	-	-
12/12	Purple Finch	2	.32	6.3
12/12	Scrub Jay	1	-	-
12/13	" "	2	-	-
12/12	Western Bluebird	7	.21	33.2
12/13	" "	7	.21	33.2

Table 77. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Data gathered by BLM, Socorro. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

Transect #31 (BLM) <i>h2/106</i>				
Date	Species	Observed Density (Birds/40 ha)	CD	Estimated Density (Birds/40 ha)
6/29	Acorn Woodpecker	1	-	-
5/11	American Kestrel	4	.24	16.6
5/12	" "	4	-	-
5/11	American Robin	1	.12	8.3
5/12	" "	2	.12	16.6
6/29	Ash-throated Flycatcher	8	.12	66.4
5/11	Black-tailed Gnatcatcher	2	.12	16.6
5/12	" "	2	.12	16.6
5/11	Blue-gray Gnatcatcher	2	.12	16.6
5/12	" "	2	.12	16.6
6/29	" "	10	.93	10.8
6/29	Broad-tailed Hummingbird	2	.12	16.6
5/11	Chipping Sparrow	4	-	-
5/12	" "	4	-	-
6/29	" "	6	-	-
5/11	Common Flicker	8	.16	49.8
5/12	" "	6	.18	33.2
6/29	" "	4	.24	16.6
6/29	Dusky Flycatcher	2	-	-
5/11	Golden Eagle	1	-	-
5/11	Grace's Warbler	4	-	-
5/12	" "	4	-	-
5/11	Hepatic Tanager	12	.12	99.6
5/12	" "	12	.12	99.6
6/29	" "	2	-	-
6/29	Mountain Bluebird	4	-	-
5/11	Mountain Chickadee	8	.14	58.1
5/12	" "	4	.37	10.8
5/11	Mourning Dove	2	-	-
5/12	" "	2	-	-
6/29	" "	2	-	-

Table 77. (continued)

Transect #31 (BLM)				
Date	Species	Observed Density (Birds/40 ha)	CD	Estimated Density (Birds/40 ha)
6/29	Olive-sided Flycatcher	2	.12	16.6
5/11	Pinyon Jay	35	.12	290.5
5/12	" "	35	.12	290.5
5/11	Plain Titmouse	8	.12	66.4
5/11	Ruby-crowned Kinglet	1	.12	8.3
5/12	" "	1	-	-
5/12	Rufous-sided Towhee	3	-	-
5/11	Scrub Jay	1	-	-
5/12	" "	1	-	-
6/29	" "	1	.12	8.3
5/11	Steller's Jay	4	.48	8.3
5/12	" "	1	-	-
6/29	" "	6	.36	16.6
5/11	Townsend's Solitaire	1	.12	8.3
5/12	" "	1	.12	8.3
5/11	Western Bluebird	6	-	-
5/12	" "	6	-	-
6/29	" "	2	.12	16.6
5/11	White-breasted Nuthatch	2	-	-
5/12	" "	2	-	-
6/29	Yellow-bellied Sapsucker	1	.12	8.3
5/11	Yellow-rumped Warbler	8	.10	83.0
5/12	" "	4	.12	33.2
6/29	" "	4	.12	33.2

Table 78. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Data gathered by BLM, Socorro. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

Transect #32 (BLM) <i>Hase mtn.</i>				
Date	Species	Observed Density (Birds/40 ha)	CD	Estimated Density (Birds/40 ha)
6/20	American Robin	3	.12	24.9
6/21	" "	5	.12	41.5
6/22	" "	3	.12	24.9
6/20	Ash-throated Flycatcher	4	.12	33.2
6/21	" "	2	-	-
6/22	" "	4	-	-
6/20	Blue-gray Gnatcatcher	2	-	-
6/21	Broad-tailed Hummingbird	1	.12	8.3
6/22	" "	1	.12	8.3
6/20	Chipping Sparrow	4	.24	16.6
6/20	Common Flicker	6	.36	16.6
6/21	" "	6	.18	33.2
6/22	" "	6	.18	33.2
6/20	Dusky Flycatcher	6	.36	16.6
6/21	" "	4	.24	16.6
6/22	" "	4	.24	16.6
6/20	Grace's Warbler	2	.12	16.6
6/20	Gray-headed Junco	8	.16	49.8
6/21	" "	8	.16	49.8
6/22	" "	6	-	-
6/20	Hepatic Tanager	4	.12	33.2
6/21	" "	9	.54	16.6
6/22	" "	5	.30	16.6
6/20	Ladder-backed Woodpecker	1	.12	8.3
6/20	Lark Bunting	4	.24	16.6
6/21	" "	6	-	-
6/22	" "	6	.36	16.6
6/21	Mexican Chickadee	5	.12	41.5
6/22	" "	1	.12	8.3
6/20	Olive-sided Flycatcher	6	.18	33.2
6/22	" "	4	.24	16.6
6/21	Red-breasted Nuthatch	1	.12	8.3

Table 78. (continued)

<u>Transect #32 (BLM)</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
6/20	Rock Wren	14	.43	32.4
6/20	Rufous-sided Towhee	4	.24	16.6
6/21	" "	2	.24	8.3
6/22	" "	2	.12	16.6
6/20	Solitary Vireo	2	.12	16.6
6/22	" "	2	.12	16.6
6/20	Steller's Jay	6	.56	10.8
6/21	" "	3	.36	8.3
6/22	" "	3	.36	8.3
6/22	Violet-green Swallow	5	-	-
6/21	Western Bluebird	10	.15	66.4
6/22	" "	7	.17	41.5
6/20	White-breasted Nuthatch	6	.12	49.8
6/21	" "	1	.12	8.3
6/22	" "	1	.12	8.3
6/20	Yellow-rumped Warbler	4	.24	16.6
6/21	" "	6	-	-
6/22	" "	6	.36	16.6

Table 79. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Data gathered by BLM, Socorro. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

Transect #33 (BLM) <i>A/ANOSA CREEK</i>				
Date	Species	Observed Density (Birds/40 ha)	CD	Estimated Density (Birds/40 ha)
5/22	Ash-throated Flycatcher	4	.24	16.6
5/22	Barn Swallow	1	-	-
5/24	" "	1	.12	8.3
5/22	Black-chinned Hummingbird	1	.12	8.3
5/23	" "	1	.12	8.3
5/24	" "	1	.12	8.3
5/23	Brown Towhee	10	.10	99.6
5/24	" "	10	.12	83.0
5/22	Chipping Sparrow	20	.24	83.0
5/23	" "	18	.22	83.0
5/24	" "	18	.22	83.0
5/22	Common Raven	1	-	-
5/23	" "	1	-	-
5/24	" "	1	-	-
5/23	Dusky Flycatcher	2	.12	16.6
5/24	" "	2	.12	16.6
5/22	House Finch	10	.12	83.0
5/23	" "	12	.08	149.4
5/24	" "	14	.09	149.4
5/22	Lark Sparrow	4	.16	24.9
5/23	" "	2	.12	16.6
5/24	" "	2	.12	16.6
5/23	Mockingbird	4	-	-
5/24	" "	4	-	-
5/22	Mountain Bluebird	18	.14	132.8
5/24	" "	12	.36	33.2
5/23	Mourning Dove	2	-	-
5/24	" "	2	-	-
5/22	Pinyon Jay	3	-	-
5/22	Rock Wren	8	.24	33.2
5/23	" "	26	.11	232.4
5/24	" "	24	.10	232.4

Table 79. (continued)

<u>Transect #33 (BLM)</u>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
5/22	Say's Phoebe	2	-	-
5/22	Scrub Jay	2	-	-
5/23	" "	1	-	-
5/24	" "	1	.19	5.4
5/23	Song Sparrow	2	-	-
5/24	" "	2	-	-
5/22	Violet-green Swallow	12	.21	58.1
5/22	Western Kingbird	11	.27	41.5
5/22	" "	9	-	-
5/24	" "	14	.84	16.6
5/22	Western Meadowlark	4	.16	24.9

Table 80. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Data gathered by BLM, Socorro. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

<u>Transect #34 (BLM)</u> <i>Point 6A</i>				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
5/30	Common Raven	6	-	-
6/1	Ferruginous Hawk	2	-	-
5/30	Horned Lark	60	.40	149.4
5/31	" "	44	.38	116.2
6/1	" "	42	.17	249.0
5/30	Sage Thrasher	2	-	-
5/30	Western Meadowlark	2	-	-
5/31	" "	2	-	-

Table 81. Bird densities and coefficient of detectability (CD) for each species, date, and transect. Data gathered by BLM, Socorro. Quemado, Driveway, and Malpais Planning Units, Socorro District, BLM, New Mexico, 1979.

Transect #35 (BLM) <i>ROCK SPRINGS</i>				
Date	Species	Observed Density (Birds/40 ha)	CD	Estimated Density (Birds/40 ha)
7/24	American Kestrel	3	-	-
7/25	" "	3	-	-
7/26	" "	3	-	-
7/24	Black-tailed Gnatcatcher	2	.12	16.6
7/26	" "	3	.12	24.9
7/24	Common Bushtit	15	-	-
7/25	" "	2	.12	16.6
7/26	" "	8	.12	66.4
7/25	Common Flicker	2	-	-
7/24	Gray-headed Junco	8	.19	41.5
7/25	" "	3	.12	24.9
7/26	" "	3	-	-
7/24	Mexican Chickadee	5	-	-
7/26	" "	5	.30	16.6
7/24	Mountain Bluebird	9	.27	33.2
7/25	" "	8	.24	33.2
7/26	" "	8	.48	16.6
7/24	Mountain Chickadee	6	.12	49.8
7/26	" "	17	.15	116.2
7/24	Pinyon Jay	4	-	-
7/25	" "	5	-	-
7/26	" "	3	-	-
7/24	Plain Titmouse	3	-	-
7/25	" "	3	.12	24.9
7/26	" "	3	-	-
7/24	Red-tailed Hawk	1	-	-
7/25	" "	1	-	-
7/24	Rock Wren	2	.12	16.6
7/25	" "	9	.12	74.7
7/26	" "	7	.12	58.1
7/24	Scrub Jay	1	-	-
7/25	Vesper Sparrow	8	.12	66.4

Table 81. (continued)

Transect #35 (BLM)				
<u>Date</u>	<u>Species</u>	<u>Observed Density (Birds/40 ha)</u>	<u>CD</u>	<u>Estimated Density (Birds/40 ha)</u>
7/24	Violet-green Swallow	3	-	-
7/26	" "	2	-	-
7/24	White-breasted Nuthatch	3	.12	24.9
7/25	" "	2	.12	16.6
7/26	" "	1	.12	8.3

APPENDIX 3

Table 82. Identification of mammals from BLM, Socorro District Project, New Mexico, 1979. Prepared by David J. Schmidly.*

Species	Sex	Specimen Numbers	
		LGL	TAMU
<i>Reithrodontomys megalotis</i>	-	2009	2004
<i>Reithrodontomys megalotis</i>	M	2026	2080
<i>Peromyscus maniculatus</i>	-	2005	2005
<i>Peromyscus maniculatus</i>	-	2029	2006
<i>Peromyscus maniculatus</i>	-	2007	2007
<i>Peromyscus maniculatus</i>	-	2008	2008
<i>Peromyscus maniculatus</i>	M	2111	2021
<i>Peromyscus maniculatus</i>	M	2109	2022
<i>Peromyscus maniculatus</i>	M	2086	2023
<i>Peromyscus maniculatus</i>	F	2110	2024
<i>Peromyscus maniculatus</i>	M	2081	2025
<i>Peromyscus maniculatus</i>	F	2082	2026
<i>Peromyscus maniculatus</i>	M	2025	2027
<i>Peromyscus maniculatus</i>	M	2024	2028
<i>Peromyscus maniculatus</i>	M	2114	2034
<i>Peromyscus maniculatus</i>	M	2116	2035
<i>Peromyscus maniculatus</i>	M	2113	2036
<i>Peromyscus maniculatus</i>	M	2117	2037
<i>Peromyscus maniculatus</i>	M	2112	2038
<i>Peromyscus maniculatus</i>	M	2123	2039
<i>Peromyscus maniculatus</i>	M	2124	2040
<i>Peromyscus maniculatus</i>	M	2122	2041
<i>Peromyscus maniculatus</i>	F	2129	2045
<i>Peromyscus maniculatus</i>	F	2130	2046
<i>Peromyscus maniculatus</i>	M	2128	2047
<i>Peromyscus maniculatus</i>	M	2070	2056
<i>Peromyscus maniculatus</i>	M	2074	2058
<i>Peromyscus maniculatus</i>	F	2073	2071
<i>Peromyscus maniculatus</i>	M	2060	2072
<i>Peromyscus maniculatus</i>	M	2064	2073
<i>Peromyscus maniculatus</i>	F	No Tag	2077
<i>Peromyscus maniculatus</i>	F	2098	2078
<i>Peromyscus maniculatus</i>	M	2099	2079
<i>Peromyscus maniculatus</i>	M	2101	2082
<i>Peromyscus maniculatus</i>	M	2100	2083
<i>Peromyscus maniculatus</i>	M	2050	2084
<i>Peromyscus maniculatus</i>	M	2120	2089
<i>Peromyscus maniculatus</i>	M	2119	2090
<i>Peromyscus maniculatus</i>	M	2013	2092
<i>Peromyscus maniculatus</i>	M	2102	2100
<i>Peromyscus maniculatus</i>	M	2104	2102
<i>Peromyscus maniculatus</i>	M	2105	2104
<i>Peromyscus maniculatus</i>	F	2016	2105
<i>Peromyscus maniculatus</i>	M	2014	2106

Table 82 (continued)

Species	Sex	Specimen Numbers	
		LGL	TAMU
<i>Peromyscus maniculatus</i>	F	2049	2113
<i>Peromyscus maniculatus</i>	M	2048	2115
<i>Peromyscus maniculatus</i>	F	2137	2121
<i>Peromyscus maniculatus</i>	F	2132	2122
<i>Peromyscus truei</i>	-	2031	2009
<i>Peromyscus truei</i>	-	2030	2010
<i>Peromyscus truei</i>	-	2028	2011
<i>Peromyscus truei</i>	F	2087	2017
<i>Peromyscus truei</i>	F	2085	2018
<i>Peromyscus truei</i>	M	2080	2019
<i>Peromyscus truei</i>	M	2084	2020
<i>Peromyscus truei</i>	F	2039	2042
<i>Peromyscus truei</i>	F	2041	2043
<i>Peromyscus truei</i>	M	2042	2044
<i>Peromyscus truei</i>	F	2118	2048
<i>Peromyscus truei</i>	F	2115	2049
<i>Peromyscus truei</i>	F	2071	2055
<i>Peromyscus truei</i>	F	2069	2059
<i>Peromyscus truei</i>	F	2075	2060
<i>Peromyscus truei</i>	M	2072	2061
<i>Peromyscus truei</i>	M	2065	2062
<i>Peromyscus truei</i>	F	2063	2063
<i>Peromyscus truei</i>	M	2059	2064
<i>Peromyscus truei</i>	F	2055	2068
<i>Peromyscus truei</i>	M	2056	2069
<i>Peromyscus truei</i>	M	2062	2070
<i>Peromyscus truei</i>	M	2061	2074
<i>Peromyscus truei</i>	F	2057	2075
<i>Peromyscus truei</i>	M	No Tag	2076
<i>Peromyscus truei</i>	F	2051	2085
<i>Peromyscus truei</i>	F	2054	2086
<i>Peromyscus truei</i>	F	2052	2087
<i>Peromyscus truei</i>	M	2053	2088
<i>Peromyscus truei</i>	F	2043	2094
<i>Peromyscus truei</i>	M	2045	2095
<i>Peromyscus truei</i>	M	2044	2096
<i>Peromyscus truei</i>	M	2047	2116
<i>Peromyscus truei</i>	M	2131	2120
<i>Onychomys leucogaster</i>	-	2002	2012
<i>Onychomys leucogaster</i>	-	2001	2013
<i>Onychomys leucogaster</i>	-	2006	2014
<i>Onychomys leucogaster</i>	-	2003	2015

Table 82 (continued)

Species	Sex	Specimen Numbers	
		LGL	TAMU
<i>Onychomys leucogaster</i>	-	2004	2016
<i>Onychomys leucogaster</i>	F	2027	2081
<i>Onychomys leucogaster</i>	M	2011	2091
<i>Onychomys leucogaster</i>	F	2012	2093
<i>Onychomys leucogaster</i>	M	2015	2107
<i>Onychomys leucogaster</i>	M	2023	2112
<i>Onychomys leucogaster</i>	F	2046	2114
<i>Eutamias dorsalis</i>	M	2083	2029
<i>Eutamias dorsalis</i>	F	2078	2030
<i>Thomomys bottae</i>	F	2077	2031
<i>Thomomys bottae</i>	F	2066	2066
<i>Thomomys bottae</i>	F	2021	2110
<i>Spermophilus variegatus</i>	F	2079	2032
<i>Kipodomys ordii</i>	M	2032	2033
<i>Peromyscus boylii</i>	M	2121	2050
<i>Peromyscus boylii</i>	M	2017	2108
<i>Peromyscus boylii</i>	M	2091	2117
<i>Peromyscus boylii</i>	M	2092	2118
<i>Neotoma albigula</i>	F	2040	2051
<i>Neotoma albigula</i>	F	2127	2052
<i>Neotoma albigula</i>	F	2067	2065
<i>Neotoma albigula</i>	F	2058	2067
<i>Neotoma albigula</i>	M	2108	2097
<i>Neotoma albigula</i>	F	2022	2109
<i>Neotoma albigula</i>	M	2133	2123
<i>Neotoma albigula</i>	M	2134	2124
<i>Neotoma albigula</i>	M	2136	2125
<i>Neotoma albigula</i>	F	2135	2126
<i>Spilosoma spilosoma</i>	F	2126	2053
<i>Spilosoma spilosoma</i>	M	2125	2054
<i>Spilosoma spilosoma</i>	F	2089	2111
<i>Spilosoma spilosoma</i>	M	2090	2119
<i>Spilosoma spilosoma</i>	F	2106	2103
<i>Peromyscus</i> sp.	?	2068	2057
<i>Dipodomys spectabilis</i>	F	2010	2098
<i>Dipodomys spectabilis</i>	M	2107	2099
<i>Perognathus merriami</i>	M	2103	2101

Table 82. (continued)

* I examined and identified 123 small mammals. Identifications were based on the author's knowledge and familiarity with the mammals of the region. Also, the following references were used to aid in making identifications:

Schmidly, D.J. 1977. The Mammals of Trans-Pecos Texas. Texas A&M University Press, College Station, 225 pp.

Bailey, V. 1931. Mammals of New Mexico. North American Fauna. 53:1-412.

Findley, J.S., A.H. Harris, D.E. Wilson, and C. Jones. 1975. Mammals of New Mexico. Univ. of New Mexico Press, Albuquerque, 360 pp. All specimens were saved and prepared as voucher specimens. They will be catalogued and deposited in the Texas Cooperative Wildlife Collection at Texas A&M University. Once the skulls are cleaned, they will be examined and used to verify these identifications, which were based on external features.

Table 83. Special Habitat Feature Map listing. BLM, Socorro District,
Maps Submitted to BLM.

Map Identification

Quemado Planning Unit

The Rincon Quadrangle

1. Raptor Habitat (Red-tailed Hawks, Kestrels)
2. Temporary Water
3. Water (well)

Armstrong Canyon Quadrangle

4. Raptor Habitat
5. Prairie Falcon Nest Site

Fence Lake SW Quadrangle

6. Deer Water
7. Water
8. Raptor Habitat
9. Raptor Habitat
10. Raptor Habitat
11. Raptor Habitat (Prairie Falcon)
12. Water
13. Gunnison's Prairie Dog Town

Cerro Prieto Quadrangle

14. Water
15. Water
16. Water
17. Gunnison's Prairie Dog Town

Twenty-two Spring Quadrangle

18. Water
19. Temporary Water
20. Water
21. Permanent Water

Moreno Hill Quadrangle (Transects 16 & 17)

22. Temporary Water
23. Temporary Water
24. Temporary Water

Mariano Springs Quadrangle (Transect 9)

25. Water

Cerro Pomo Quadrangle

26. Temporary Water
27. Temporary Water
28. Temporary Water
29. Temporary Water
30. Temporary Water
31. Temporary Water
32. Temporary Water

Table 83. (continued)

Map Identification

- Techado Quadrangle
 - 33. Gunnison's Prairie Dog Town
 - 34. Gunnison's Prairie Dog Town
- Rincon Hondo Quadrangle
 - 35. Water (private)
 - 36. Raptor Nesting Sites (Red-tailed Hawks, Kestrels)
 - 37. Prairie Falcon Habitat
- Tejana Mesa SW Quadrangle
 - 38. Temporary Water
 - 39. Raptor Nesting Sites (Red-tailed Hawks)
- Salazar Canyon Quadrangle
 - 40. Water
 - 41. Water
 - 42. Water
- Lake Armijo Quadrangle
 - 43. Pronghorn Water
 - 44. Pronghorn Water
- Nelson Reservoir NE Quadrangle
 - 45. Raptor Nesting Sites
- Zuni Salt Lake Quadrangle
 - 46. Pronghorn Water
 - 47. Permanent Water
 - 48. American Kestrel Habitat
- Adams Diggings Quadrangle (Transect 10)
 - 49. Deer Water
 - 50. Well
 - 51. Deer Water
 - 52. American Kestrel Nest Site
 - 53. Gunnison's Prairie Dog Town
- Blaines Lake Quadrangle (Transects 13, 14, & 15)
 - 54. Prairie Falcon Nest Site
 - 55. Golden Eagle Habitat
 - 56. Golden Eagle Habitat
 - 57. Windmill
 - 58. Temporary Water
 - 59. Gunnison's Prairie Dog Town
 - 60. Windmill
 - 61. Permanent Water (well)
- Veteado Mountain Quadrangle
 - 62. Golden Eagle Habitat
 - 63. Water (Tank & Seep)
- Quemado Quadrangle (Transects 7 & 8)
 - 64. Permanent Water
 - 65. Permanent Water
- Red Hill Quadrangle (Transects 11 & 12)
 - 66. Gunnison's Prairie Dog
 - 67. Permanent Water
 - 68. American Kestrel Nests

Table 83. (continued)

Map Identification

Omega Quadrangle

- 69. Pronghorn Water

Goat Spring Quadrangle

- 70. Two Golden Eagle Nests
- 71. Available Water

Malpais Planning Unit

Cebollita Peak Quadrangle

- 1. Permanent Water (nesting mallards)

Cerro Brillante Quadrangle (Transects 28 & 29)

- 2. Temporary Water
- 3. Temporary Water
- 4. Temporary Water
- 5. Temporary Water
- 6. Temporary Water

Bonine Canyon Quadrangle (Transect 18)

Los Pilares Quadrangle

- 7. Windmill
- 8. Windmill

Sand Canyon Quadrangle (Transect 23)

- 9. American Kestrel Nest Site

Wild Horse Canyon Quadrangle

- 10. Temporary Water
- 11. Windmill
- 12. Permanent Water
- 13. Permanent Water
- 14. Windmill

Laguna Honda Quadrangle

- 15. Temporary Water
- 16. Permanent Water
- 17. Permanent Water

Ice Caves SE Quadrangle

- 18. Permanent Water
- 19. Permanent Water
- 20. Permanent Water
- 21. Temporary Water
- 22. Semi-permanent Water
- 23. Temporary Water

Grants SE Quadrangle

- 24. Raptor Habitat

Ice Caves Quadrangle (Transect 24)

- 25. Raptor Habitat
- 26. Raptor Habitat
- 27. Temporary Water
- 28. Lava Tube - Ice Caves
- 29. Lava Tube - Ice Caves
- 30. Lava Tube - Ice Caves
- 31. Temporary Water

Table 83. (continued)

Map Identification

York Ranch Quadrangle (Transect 19)

- 32. Permanent Water
- 33. Permanent Water
- 34. Temporary Water
- 35. Temporary Water
- 36. Temporary Water
- 37. Temporary Water
- 38. Temporary Water
- 39. Temporary Water

Arrosa Ranch Quadrangle (Transect 27)

- 40. Raptor Habitat
- 41. Raptor Habitat

York Ranch SE Quadrangle

- 42. Well

North Pasture Quadrangle (Transects 20, 21, 22, 23, 26)

- 43. Prairie Falcon Habitat
- 44. Prairie Falcon Habitat
- 45. Prairie Falcon Habitat
- 46. Windmill
- 47. Gunnison's Prairie Dog Town
- 48. Temporary Water
- 49. Temporary Water
- 50. Gunnison's Prairie Dog Town
- 51. Temporary Water
- 52. Gunnison's Prairie Dog Town and Burrowing Owls
- 53. Windmill

Cerro Hueco Quadrangle

- 54. Temporary Water
- 55. Temporary Water
- 56. Temporary Water
- 57. Temporary Water
- 58. Temporary Water

Tres Lagunas Quadrangle

- 59. Well
- 60. Windmill
- 61. Windmill
- 62. Windmill
- 63. Well
- 64. Well
- 65. Well

Driveway Planning Unit

Anderson Peak Quadrangle

- 1. Well
- 2. Well
- 3. Well
- 4. Well
- 5. Well
- 6. Well
- 7. Well

Table 83. (continued)

Map Identification

Datil Quadrangle

8. Well

9. Windmill

Wahoo Ranch Quadrangle (Transects 3, 4, & 5)

10. American Kestrel Nest Site

11. American Kestrel Nest Site

12. American Kestrel Nest Site

Squaw Peak Quadrangle

13. Raptor Nesting Habitat

14. Windmill

Oak Peak Quadrangle

15. Temporary Water

16. Well

17. Temporary Water

18. Temporary Water

Kellog Well Quadrangle

19. Temporary Water

20. American Kestrel Nest Sites

21. American Kestrel Nest Sites

22. American Kestrel Nest Sites

23. Caves (Bat Habitat)

24. Caves (Bat Habitat)

25. Temporary Water

26. Golden Eagle Nest Site

27. Prairie Falcon Nest Site

28. Raptor and Ungulate Habitat

Arrowhead Well Quadrangle

29. Water (well)

30. Water (well)

31. Water (well)

32. Water (well)

33. Water (well)

34. Temporary Water

35. Water (well)

36. Temporary Water

37. Water (well)

38. Water (well)

39. Temporary Water

Arroyo Lanavaso Quadrangle

40. Well

41. Temporary Water

42. Well

43. Well

44. Windmill

45. Temporary Water

Monica Saddle Quadrangle

46. Raptor Habitat (possible nesting sites)

Table 83. (continued)

Map Identification

Sugarloaf Mountain Quadrangle

- 47. Well
- 48. Raptor Nesting Habitat
- 49. Windmill
- 50. Well
- 51. Well
- 52. Well
- 53. Well

Augustine Well Quadrangle (Transect 1)

- 54. Well
- 55. Well
- 56. Well
- 57. Well

Montoya Butte Quadrangle

- 58. Well
- 59. Permanent Water
- 60. Well
- 61. Well

Lion Mountain Quadrangle

- 62. Permanent Water
 - 63. Permanent Water
 - 64. Permanent Water
-

Table 84. Verified and hypothetical bird occurrence by habitat type. BLM, Socorro District, New Mexico, 1979

[illegible]

Table 84. (continued)

Species	Habitat Type Code															
	002	004	005/007	008	009	011	014	015	016	018	019/020	021	022	026	031	032
Marsh Hawk (<i>Circus cyaneus</i>)	V	H					H		V				H			
Rough-legged Hawk (<i>Buteo lagopus</i>)	V	H					H		V				H			
Ferruginous Hawk (<i>Buteo regalis</i>)	V	H														
Red-tailed Hawk	V		V	V	V					H	V	V		V		
(<i>Buteo jamaicensis</i>)																
Swainson's Hawk (<i>Buteo swainsoni</i>)	V		V	V	H				V							
Zone-tailed Hawk			H	H	H									H		
(<i>Buteo albonotatus</i>)																
Golden Eagle (<i>Aquila chrysaetos</i>)	V						V		V							
Bald Eagle	V															
(<i>Haliaeetus leucocephalus</i>)																
Prairie Falcon (<i>Falco mexicanus</i>)	V								V							
Peregrine Falcon (<i>Falco peregrinus</i>)			V					H								
Merlin (<i>Falco columbarius</i>)			V													
American Kestrel	V	V	V	V	V		V						V	V		
(<i>Falco sparverius</i>)																
Galliformes																
Blue Grouse (<i>Dendragapus obscurus</i>)								H								
Scaled Quail (<i>Callipepla squamata</i>)									V							
Gambel's Quail (<i>Lophortyx gambelii</i>)			H	H	H		H									
Montezuma Quail			H	H	H											
(<i>Cyrtonyx montezumae</i>)																
Wild Turkey (<i>Meleagris gallopavo</i>)								H								
Ciconiiformes																
Cattle Egret (<i>Bubulcus ibis</i>)																

Wetland
Riparian

Table 84. (continued)

Species	Habitat Type Code															
	002	004	005/007	008	009	011	014	015	016	018	019/020	021	022	026	031	032
Gruiformes																
American Coot (<i>Fulica americana</i>)																
Charadriiformes																
American Avocet (<i>Recurvirostra americana</i>)																
Killdeer (<i>Charadrius vociferus</i>)																
Mountain Plover (<i>Charadrius montanus</i>)	V	H														
Long-billed Curlew (<i>Numenius americanus</i>)	H	H														
Spotted Sandpiper (<i>Actitis macularia</i>)																
Columbiformes																
Band-tailed Pigeon (<i>Columba fasciata</i>)																
Rock Dove (<i>Columba livia</i>)																
Mourning Dove (<i>Zenaidura macroura</i>)	V	H	V	V	V	V	H	H	H	H	V	V	V	V	V	H
Cuculiformes																
Roadrunner (<i>Geococcyx californianus</i>)	H	H	H	H	H											
Strigiformes																
Barn Owl (<i>Tyto alba</i>)	V	H														
Screech Owl (<i>Otus asio</i>)			V													
Great Horned Owl (<i>Bubo virginianus</i>)	H	H	V	H												

Wetland
Riparian

036

034

032

031

026

022

021

019/020

018

016

015

014

011

009

008

005/007

004

002

Table 84. (continued)

Species	Habitat Type Code															
	002	004	005/007	008	009	011	014	015	016	018	019/020	021	022	026	031	032
Pygmy Owl (<i>Glaucidium gnoma</i>)			H	H	H			H								
Burrowing Owl (<i>Athene cunicularia</i>)	V															
Flammulated Owl (<i>Otus flammeolus</i>)			H	H	H			H								
Spotted Owl (<i>Strix occidentalis</i>)			H	H	H			H								
Long-eared Owl (<i>Asio otus</i>)			H	H	H			H								
Saw-whet Owl (<i>Aegolius acadicus</i>)			H	H	H			H								
Caprimulgiformes																
Whip-poor-will			H	H	H			H								
(<i>Caprimulgus vociferus</i>)																
Poor-will	H	H	H	H	H											
(<i>Phalaenoptilus nuttallii</i>)																
Common Nighthawk (<i>Chordeiles minor</i>)	V	V	V	V	V	V		H	H	V	V	V	V	V	V	
Lesser Nighthawk		V	V	V	V			H								
(<i>Chordeiles acutipennis</i>)			V	H	H											
Apodiformes																
White-throated Swift																
(<i>Aeronautes saxatalis</i>)																
Broad-tailed Hummingbird	V		V	V	V			H		V	V	V	V	V	V	
(<i>Selasphorus platycercus</i>)																
Black-chinned Hummingbird			H	H	H			H								
(<i>Archilochus alexandri</i>)																
Rufous Hummingbird			V	H	H											
(<i>Selasphorus rufus</i>)																
Rivoli's Hummingbird			H	H	H											
(<i>Eugenes fulgens</i>)																

Wetland
Riparian

Table 84. (continued)

Species	Habitat Type Code															
	002	004	005/007	008	009	011	014	015	016	018	019/020	021	022	026	031	032
Coraciiformes																
Belted Kingfisher (<i>Megasceryle alcyon</i>)							H								H	V
Piciformes																
Common Flicker (<i>Colaptes auratus</i>)	V	V	V	V	V	V		H		V	V	H		V	H	H
Ladder-backed Woodpecker (<i>Picoides scalaris</i>)													V			H
Acorn Woodpecker (<i>Melanerpes formicivorus</i>)			V	H	H			H					V	V		H
Lewis' Woodpecker (<i>Melanerpes lewis</i>)	V		H	H	H			H						V		V
Yellow-bellied Sapsucker (<i>Sphyrapicus varius</i>)								H								
Williamson's Sapsucker (<i>Sphyrapicus thyroideus</i>)								H								V
Hairy Woodpecker (<i>Picoides villosus</i>)			V	V	V			H		V	V	V		V	V	H
Downy Woodpecker (<i>Picoides pubescens</i>)			V					H								V
Northern Three-toed Woodpecker (<i>Picoides tridactylus</i>)								H								H
Passeriformes																
Eastern Kingbird (<i>Tyrannus tyrannus</i>)	V		H	H	H	H	H	H							H	
Western Kingbird (<i>Tyrannus verticalis</i>)																
Cassin's Kingbird (<i>Tyrannus vociferans</i>)	V	V	V	V	V	V		H		V	V	V	V	V	V	V

Table 84. (continued)

Species	Habitat Type Code																			
	002	004	005/007	008	009	011	014	015	016	018	019/020	021	022	026	031	032	034	036	Wetland	Riparian
Ash-throated Flycatcher (<i>Myiarchus cinerascens</i>)	V		V	V	V		V	H		V	V	V		V	V		V			
Say's Phoebe (<i>Sayornis saya</i>)	V		V				V				V	V				V				H
Hammond's Flycatcher (<i>Empidonax hammondi</i>)			H	H	H			H		H							V			
Dusky Flycatcher (<i>Empidonax oberholseri</i>)			V					H		H										
Gray Flycatcher (<i>Empidonax wrightii</i>)			V							V	H				H					
Willow Flycatcher (<i>Empidonax traillii</i>)			V					H		V	H				H		V			
Western Flycatcher (<i>Empidonax difficilis</i>)			V					H		H	H				H		V			
Western Wood Pewee (<i>Contopus sordidulus</i>)	V		V		V			H		V	V	V		V	V		V			
Olive-sided Flycatcher (<i>Nuttallornis borealis</i>)			V	V				H		H							V			
Horned Lark (<i>Eremophila alpestris</i>)	V	V	V	V		V	V		V			V	V			V		V		
Barn Swallow (<i>Hirundo rustica</i>)																				
Cliff Swallow (<i>Petrochelidon pyrrhonota</i>)	V		V	V	V			H		V	V	V			V	V	V	V		H
Violet-green Swallow (<i>Tachycineta thalassina</i>)			V															V		H
Rough-winged Swallow (<i>Stelgidopteryx ruficollis</i>)																				
Purple Martin (<i>Progne subis</i>)			V					H									V	V		H
Steller's Jay (<i>Cyanocitta stelleri</i>)								H	H	H							V	V		H

Table 84. (continued)

Species	Habitat Type Code																			
	002	004	005/007	008	009	011	014	015	016	018	019/020	021	022	026	031	032	034	036	Wetland	Riparian
Scrub Jay (<i>Aphelocoma coerulescens</i>)		V	V	V	V				V	V	V		V			V				
Mexican Jay (<i>Aphelocoma ultramarina</i>)			V	V	V				V	V	V					V				
Pinyon Jay (<i>Gymnorhinus cyanocephalus</i>)	V		V	V	V	V				V	V	V			V	V	V	V		
Common Raven (<i>Corvus corax</i>)	V	V	V	H	H	V	V	H	V	H	V		V		V	V	H	V		
Common Crow (<i>Corvus brachyrhynchos</i>)			V	H	H	V	V	H		H					V	V	H			
Clark's Nutcracker (<i>Nucifraga columbiana</i>)								H												
Black-capped Chickadee (<i>Parus atricapillus</i>)			V	H	H															
Mountain Chickadee (<i>Parus gambeli</i>)			V	V	V	V					V	V			V		V			
Plain Titmouse (<i>Parus inornatus</i>)	V		V	V	V	V					V	V		V	V		V			
Common Bushtit (<i>Psaltriparus minimus</i>)			V	V	V	V		H		H		V		V			V			
White-breasted Nuthatch (<i>Sitta carolinensis</i>)	V		V	V	V	V		H		V	V	V	V	V	V		V			
Red-breasted Nuthatch (<i>Sitta canadensis</i>)					V						V			V			V			
Pygmy Nuthatch (<i>Sitta pygmaea</i>)					H			H		H				H			V			
Brown Creeper (<i>Certhia familiaris</i>)			H	H	H			H		V							V			
House Wren (<i>Troglodytes aedon</i>)			V	V	V	V		H		H				V			H			
Bewick's Wren (<i>Thryomanes bewickii</i>)	V		V	V	V	V								V	V	V	V			
Rock Wren (<i>Salpinctes obsoletus</i>)	V	V	V	V	V	V				V	V			V	V	V	V	V		H
Canyon Wren (<i>Catherpes mexicanus</i>)			V	V	V	V		H		H	V				V	V	V			
Mockingbird (<i>Mimus polyglottos</i>)	V	V	H	H	V	V		H		H	H				V	V	V			H
Bendire's Thrasher (<i>Toxostoma bendirei</i>)	V	V				V	V	H						V		V		V		

Table 84. (continued)

Species	Habitat Type Code																			
	002	004	005/007	008	009	011	014	015	016	018	019/020	021	022	026	031	032	034	036	Wetland	Riparian
Curve-billed Thrasher (<i>Toxostoma curvirostre</i>)																				
Sage Thrasher (<i>Oreoscoptes montanus</i>)																				
American Robin (<i>Turdus migratorius</i>)																				
Townsend's Solitaire (<i>Myadestes townsendi</i>)																				
Hermit Thrush (<i>Catharus guttata</i>)																				
Swainson's Thrush (<i>Catharus ustulatus</i>)																				
Western Bluebird (<i>Sialia mexicana</i>)																				
Mountain Bluebird (<i>Sialia currucoides</i>)																				
Blue-gray Gnatcatcher (<i>Polioptila caerulea</i>)																				
Ruby-crowned Kinglet (<i>Regulus calendula</i>)																				
Golden-crowned Kinglet (<i>Regulus satrapa</i>)																				
Cedar Waxwing (<i>Bombycilla cedrorum</i>)																				
Northern Shrike (<i>Lanius excubitor</i>)																				
Loggerhead Shrike (<i>Lanius ludovicianus</i>)																				
Starling (<i>Sturnus vulgaris</i>)																				
Gray Vireo (<i>Vireo vicinior</i>)																				
Solitary Vireo (<i>Vireo solitarius</i>)																				
Warbling Vireo (<i>Vireo gilvus</i>)																				

Table 84. (continued)

Species	Habitat Type Code																			
	002	004	005/007	008	009	011	014	015	016	018	019/020	021	022	026	031	032	034	036	Wetland	Riparian
Bell's Vireo (<i>Vireo bellii</i>)			V	H	H															
Orange-crowned Warbler (<i>Vermivora celata</i>)														V					H	H
Virginia's Warbler (<i>Vermivora virginiae</i>)								H						H					H	
Olive Warbler (<i>Peucedramus taeniatus</i>)								V*									H			
Yellow Warbler (<i>Dendroica petechia</i>)																			H	H
Lucy's Warbler (<i>Dendroica luciae</i>)			V	H	H										V				H	H
Yellow-rumped Warbler (<i>Dendroica coronata</i>)																				
Townsend's Warbler (<i>Dendroica townsendi</i>)																V				
Black-throated Gray Warbler (<i>Dendroica nigrescens</i>)			V	H	V										V					
Grace's Warbler (<i>Dendroica graciae</i>)										V										
Chestnut-sided Warbler (<i>Dendroica pensylvanica</i>)															V					
Ovenbird (<i>Seiurus aurocapillus</i>)																				
MacGillivray's Warbler (<i>Oporornis tolmiei</i>)			V	H	H										V					
Wilson's Warbler (<i>Wilsonia pusilla</i>)																				
Red-faced Warbler (<i>Cardellina rubrifrons</i>)																				
Common Yellowthroat (<i>Geothlypis trichas</i>)			V	H	H														H	H

Table 84. (continued)

Species	Habitat Type Code															
	002	004	005/007	008	009	011	014	015	016	018	019/020	021	022	026	031	032
Yellow-breasted Chat (<i>Icteria virens</i>)														H		
Painted Redstart (<i>Myroborus pictus</i>)															H	
House Sparrow (<i>Passer domesticus</i>)																
Eastern Meadowlark (<i>Sturnella magna</i>)	V	V	V	V	H		V									V
Western Meadowlark (<i>Sturnella neglecta</i>)	V	V				V	V		V							V
Yellow-headed Blackbird (<i>Xanthocephalus xanthocephalus</i>)	V															
Red-winged Blackbird (<i>Agelaius phoeniceus</i>)																
Brewer's Blackbird (<i>Euphagus cyanocephalus</i>)								V*								
Brown-headed Cowbird (<i>Molothrus ater</i>)	V	V	V	V	H									V		
Scott's Oriole (<i>Icterus parisorum</i>)		V	V	H	H									H		
Northern Oriole (<i>Icterus galbula</i>)		V	V	H	H									H		
Western Tanager (<i>Piranga ludoviciana</i>)		V	V	H	H									V		
Hepatic Tanager (<i>Piranga flava</i>)											V	V		V		
Rose-breasted Grosbeak (<i>Phaeoicticus ludovicianus</i>)	V	V	V	H	H								V	V		
Black-headed Grosbeak (<i>Phaeoicticus melanocephalus</i>)		V	V	H	H						V					
Blue Grosbeak (<i>Guiraca caerulea</i>)																
Evening Grosbeak (<i>Hesperiphona vespertina</i>)		V	V	H	H											

Table 84. (continued)

Species	Habitat Type Code															
	002	004	005/007	008	009	011	014	015	016	018	019/020	021	022	026	031	032
Lazuli Bunting (<i>Passerina amoena</i>)														V*		
Purple Finch (<i>Carpodacus purpureus</i>)																
Cassin's Finch (<i>Carpodacus cassinii</i>)																
House Finch (<i>Carpodacus mexicanus</i>)																
Pine Grosbeak (<i>Pinicola enucleator</i>)																
Pine Siskin (<i>Carduelis pinus</i>)																
American Goldfinch (<i>Carduelis americana</i>)																
Lesser Goldfinch (<i>Carduelis psaltria</i>)																
Red Crossbill (<i>Loxia curvirostra</i>)																
Green-tailed Towhee (<i>Pipilo chlorurus</i>)																
Rufous-sided Towhee (<i>Pipilo erythrophthalmus</i>)																
Brown Towhee (<i>Pipilo fuscus</i>)																
Lark Bunting (<i>Calamospiza melanocorys</i>)																
Vesper Sparrow (<i>Poocetes gramineus</i>)																
Lark Sparrow (<i>Chondestes grammacus</i>)																
Black-throated Sparrow (<i>Amphispiza bilineata</i>)																
Sage Sparrow (<i>Amphispiza belli</i>)																
Dark-eyed Junco (<i>Junco hyemalis</i>)																

Wetland
Riparian

036

034

032

031

026

022

021

019/020

018

016

015

014

011

009

008

005/007

004

002

Table 84. (continued)

Species	Habitat Type Code																			
	002	004	005/007	008	009	011	014	015	016	018	019/020	021	022	026	031	032	034	036	Wetland	Riparian
Gray-headed Junco (<i>Junco caniceps</i>)																				
Chipping Sparrow (<i>Spizella passerina</i>)																				
Brewer's Sparrow (<i>Spizella breweri</i>)																				
Black-chinned Sparrow (<i>Spizella atrogularis</i>)																				
White-crowned Sparrow (<i>Zonotrichia leucophrys</i>)																				
Lincoln's Sparrow (<i>Melospiza lincolni</i>)																				

* Verified by other sources (Bailey 1928, Ligon 1961, Hubbard 1978).

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